Part

E

Conservation Plans for Other List A Wildlife Species

Contents

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This document provides information about other List A wildlife species, identifies potential effects on these species from activities covered by the Plan, and describes how those effects will be avoided or mitigated. For information about and measures for List B wildlife and plant species, see Part F of Volume IV; for information about and measures for all List A and List B fish species, see the Aquatic Species Conservation Plan in Volume IV.

INFORMATION SOURCES

The following sources were consulted in an initial scoping process to develop a comprehensive list of species to be covered by the Plan as a whole and the ITPs in particular:

- California Department of Fish and Game Personnel, Environmental Specialist III Mr. Armand Gonzales, and Environmental Specialist III Mr. William Condon, Eureka, CA;
- State and Federally Listed Endangered and Threatened Animals of California, January 1998, State of California, The Resources Agency, Department of Fish and Game;
- State of California, The Resources Agency, Department of Fish and Game, Special Animals March 1998;
- Sensitive species designated by the Board of Forestry pursuant to 14 CCR 895.1, California Forest Practice Rules, Title 14, California Code of Regulations, January 1998;
- The California Wildlife Habitat Relationships (CWHR) Database System, Humboldt County Subset, Version 6.0;
- Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12, August 20, 1994;
- Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Proposed Rule, 50 CFR Part 17, November 15, 1994;
- State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division, United States Geologic Survey Quad Overlay Maps, Dated 6 March, 1998

OTHER LIST A WILDLIFE

A. Amphibians

1. *Rhyacotriton variegatus,* southern torrent salamander

a) Natural History

The southern torrent salamander is a California species of special concern, and has been petitioned for federal listing under the ESA as threatened in California. In a report to the California Fish and Game Commission, CDFG has recommended that state listing is not warranted at this time (Brode 1995). The range of this species in California coincides with the extent of coastal forests in the northwestern part of the state, and inland forests in the Willow Creek and Ruth-South Fork Mountain areas, up to approximately 3,900' above sea level, south to Mendocino County (Anderson 1968). The specific habitat of southern torrent salamanders includes cold mountain streams, springs, seeps, waterfalls, and moss covered rock rubble with flowing water in humid coastal coniferous forests (Anderson 1968, Bury and Corn 1988, Welsh 1990, Zeiner et al. 1990a). Water temperatures for this species range from 6.5" to 15°C apparently reaching a stress level at 17.2°C, with the optimum range being 8° to 13°C (Welsh and Lind 1996, Diller and Wallace 1996). An average 60m riparian buffer width was suggested to maintain suitable air and soil temperatures, and relative humidity regimes (Welsh et al. 1993, Ledwith 1996). These salamanders seem to inhabit the splash zone, and are rarely found more than one meter from water (Anderson 1968, Nussbaum and Tait 1977). As with tailed frogs, southern torrent salamanders have been linked to old growth forest (Welsh 1990) but observations of this species in young growth stands indicates that habitat components such as substrate, canopy closure, woody debris, and ambient temperatures may be more important than forest age (Diller and Wallace 1996, Welsh and Lind 1996, and Bury and Corn 1989). Recent research indicates that watercourse gradient and substrate type are significant habitat variables (Diller and Wallace 1996). Embeddedness and substrate size have been summarized by Diller and Wallace (1996) and Welsh and Lind (1996) as < 18-33% embeddedness, with ≥ 68% gravel, boulder, or bedrock, and < 50% cobble with gravel (2-16mm). The breeding period for this species occurs generally between October and July, with a peak egg-laying period in spring or early summer (Nussbaum and Tait 1977). Clutch size ranges from 2 to 16, and sexual maturity is reached 1 to 1.5 years after metamorphosis, at 4.5 to 5 years (Zeiner et al. 1990a).

b) Baseline Condition

Incidental observations on the PALCO ownership indicate that this species is widely distributed in suitable habitat. PALCO observations of this species have been from the Bear Mattole WAA, Yager WAA, Eel WAA, Humboldt WAA, and Van Duzen WAA (Wroble and Waters 1989, PALCO unpublished data). As with the tailed frog, it seems that stream substrate conditions relating to the occurrence of parent geologic material are a limiting habitat factor for this species. As mentioned above, watercourse gradient is also a significant variable, with the occurrence of this animal relating to high gradient seeps and streams where water flow is able to maintain interstitial spaces between rock and rubble. Although there are approximately 1017 miles of Class I and II streams within the WAA's comprising the PALCO ownership (Volume I, Table 2) it is likely that only the high gradient reaches of Class II streams with substrates of consolidated parent material may contain suitable habitat for the southern torrent salamander. There are approximately 752 Class II stream miles, corresponding to about 16,866 acres of Class II RMZs.

c) Activities with Potential for Impacts

Logging, road construction, and livestock grazing have a low potential for indirect impacts to this species through habitat modification. Instream habitat projects have a low potential for impacts through habitat modification. Road construction activities, especially crossings of headwall seeps or springs can cause indirect impacts via habitat modification. Surveys or monitoring which include permitted scientific collection of individuals could also impact the species.

d) Mitigation Measures

Diller and Wallace (1996) listed several factors which suggest that habitat for southern torrent salamanders will be maintained and possibly improved. Among the factors were: current FPRs mandate protection for seeps or streams with suitable habitat; equipment exclusion zones must be applied appropriately; tree retention requirements for maintenance of shade canopy; and improved road construction and other logging practices (i.e. cable yarding). Protection measures proposed under this plan meet or exceed those in the FPRs. Protection of riparian zones is intended to maintain shade canopy, reduce the potential for sedimentation, and maintain other aspects of water quality, thereby minimizing potential impacts of habitat modification. Standards of the Aquatics Conservation Strategy (Volume IV, Part D) for tree retention, in terms of size and quantity, exceed those recommended by Welsh (1993). Welsh (1993) described tree retention for suitable habitat as 6 to 54 + trees per hectare greater than 21" d.b.h.. To meet basal area requirements for 300 sq ft/acre the Plan requires approximately 76 trees/hectare greater than 24" d.b.h. (the 21" size class falls into the 18" to 24" range in the Plan, and so are not counted here). To meet the 240 sq ft/acre basal area standard requires approximately 69 trees/hectare greater than 24" d.b.h. If the 20" to 24" size class is included, the requirement is about 96 trees/hectare greater than 20" d.b.h.). Mitigation relating to road construction and maintenance will reduce or eliminate sediment delivery to streams, In addition, the MMCAs and the Headwaters Reserve include habitat for this species, which will be conserved **as** part of the plan.

e) Potential Impacts of the Incidental Taking

The plan area represents a relatively small portion of the species' range and numbers. The species occupies a somewhat specialized niche which is afforded protection in the plan. The riparian mitigations are likely to be sufficient to avoid any adverse impacts, or maintain impacts at low levels.

f) Monitoring/Adaptive Management

As described in Volume IV, Part D (Section 2.3) PALCO proposes to implement an adaptive management process for this species as part of the watershed analysis. Information on habitat conditions and species distribution will be integrated during the synthesis portion of the analysis to develop customized prescriptions to provide for the needs of all List A aquatic species.

2. *Ascaphus truei,* tailed frog

a) Natural History

The tailed frog is a California species of special concern. In California the range of this species is from sea level to approximately 6,500' above sea level, generally in areas which receive over 40" of rain annually in Siskiyou, Del Norte, Trinity, Shasta, Tehama, Humboldt, and possibly Sonoma counties (Bury 1968). Tailed frogs apparently avoid marshes, wetlands, and slow sandy streams

(Daugherty and Sheldon 1982). The specific habitat of this species, for which they seem highly specialized, is swift, perennial streams with low temperatures (Nussbaum et al. 1983). For larvae, water temperatures range from 5^{o} to 18.5^{o} C (Brown 1975, Claussen 1973). Although habitat for tailed frogs has primarily been found in mature and old growth coniferous forests (Bury 1983, Bury and Corn 1988, Welsh 1990, Welsh et al 1993) they have also been found in young growth forest. This suggests the possibility that other factors of habitat suitability, such as water temperature and substrate characteristics, may be more important than forest age (Welsh 1990). Other habitat features of this species mentioned in the literature includes > 85% canopy closure or < 22°C air temperature; c 14°C soil temperature, and > 40% relative humidity (Welsh et al. 1993, Bury and Corn 1989, Chen et al. 1993). An average 60m riparian buffer width was suggested to maintain suitable air and soil temperatures, and relative humidity regimes (Welsh et al. 1993, Ledwith 1996). Tailed frog breeding generally occurs during the early fall (August-September), but pairs of frogs have been found clasped together at any time of the year (Nussbaum et al. 1983). Egg clusters can range in size from 33 to 98, and take about a month to hatch. The tadpoles have a suction like mouth which allows attachment to rocks. Cobble and boulder substrates with relatively low embeddedness are important for the larvae (Hawkins et al. 1988, Altig and Brodie 1972). The larvae require 2-3 years to transform. The presence of woody debris in streams may be beneficial, or perhaps necessary, for microhabitat requirements, including egg cover (Welsh et al. 1993, Bury and Corn 1988, Diller pers.comm.).

b) Baseline Condition

Incidental observations indicate that this species has a patchy, yet widespread distribution in suitable habitat on this ownership, however, survey information is limited. PALCO observations of tailed frogs have occurred in the Eel WAA, Bear Mattole WAA, Yager WAA, Humboldt WAA, and Van Duzen WAA (Wroble and Waters 1989, PALCO unpublished data). It appears that stream substrate conditions relating to the occurrence of parent geologic material are a limiting habitat factor for this species. Although there are approximately 1017 miles of Class I and II streams within the WAA's comprising the PALCO ownership (Volume I, Table 2) it is likely that only the high gradient reaches of Class II streams with substrates of consolidated parent material may contain suitable tailed frog habitat. There are approximately 752 Class II stream miles, corresponding to about 16,866 acres of Class II RMZs. Observations of this species have been made during multi-species surveys (Volume II, Part K).

c) Activities with Potential for Impacts

Logging and livestock grazing are activities with a low potential for impacts to this species through habitat modification. The larvae may be especially vulnerable to impacts from sedimentation, higher flows, and other potential impacts prior to their transformation into adults. Instream habitat projects have a low potential for impacts through habitat modification. Surveys or monitoring could include permitted scientific collection of individuals.

d) Mitigation Measures

Protection of riparian zones is intended to maintain shade canopy, reduce the potential for sedimentation, and maintain other aspects of water quality, thereby minimizing potential impacts of habitat modification. Large woody debris retention and recruitment related to riparian management strategies, and instream habitat improvement projects which place wood into the streams will provide cover and potential nest sites. Mitigations relating to road construction and maintenance will reduce or eliminate sediment delivery to streams. In addition, the MMCAs include habitat for this species which will be conserved as part of the Plan.

e) Potential Impacts of the Incidental Taking

The Plan Area represents a relatively small portion of the species' overall range and numbers. The species occupies a somewhat specialized niche which is afforded protection in the Plan through mitigation and minimization measures described above. The riparian mitigations are likely to be sufficient to avoid adverse impacts or constrain impacts to low levels.

f) Monitoring/Adaptive Management

As described in Volume IV, Part D (Section 2.3) PALCO proposes to implement an adaptive management process for this species as part of the watershed analysis. Information on habitat conditions and species distribution will be integrated during the synthesis portion of the analysis to develop customized prescriptions to provide for the needs of all List A aquatic species.

3. Rana aurora, red-legged frog

a) Natural History

The red-legged frog is a California species of special concern. The northern subspecies *(R. a. aurora)* was a Category 2 candidate for federal listing, while the California subspecies *(R. a. draytonii)* has been listed as threatened. Red-legged frogs found in the area between southern Del Norte County and northern Marin County exhibit intergrade characteristics of both *R.* a. *aurora* and *R.* a. *draytonii.* The threatened listing status of *R. a. draytonii* does not extend into the intergrade zone, which includes the Plan Area (Federal Register/ Vol. 61, No. 101123 May, 1996). While the intergrade frog seems relatively common and widespread, populations of the *R. a. draytoni* subspecies of the inland valleys have probably been in decline since the turn of the century due to commercial exploitation (Jennings and Hayes 1985). In the coast range red-legged frogs occur at elevations below 3,900' above sea level (Zeiner et al. 1990a). Specific habitat for red-legged frogs includes ponds, slow moving creeks, puddles, and drainage ditches in or near moist forests and riparian habitats (Nussbaum et al. 1983, Bury and Corn 1988b). However, dispersal during wet weather conditions may lead to the finding of individuals considerable distances from breeding sites (Zeiner et al. 1990a). Deep pools with little or no flow, submerged vegetation, and shade are necessary for egg laying and metamorphosis (Nussbaum et al. 1983; Cockran and Thorns 1996; Hayes and Jennings 1988). Larval development takes from 11 to 20 weeks. Dense vegetation close to the water level and undercut banks appear to be essential for shade and protective cover (Nussbaum et al. 1983).

b) Baseline Condition

Incidental observations indicate that this species may be locally abundant in suitable habitat in the plan area. PALCO observations have occurred in the following WAAs: Eel, Humboldt, and Van Duzen (Wroble and Waters 1989, PALCO unpublished data). Considering the habitat types that these animals have been found in, it is likely that red-legged frogs occur in all WAAs of the plan area. There are approximately 1,017 miles of Class I and II streams in the Plan Area, corresponding to about 27,951 acres of Class I and II RMZs. It is likely that red-legged frogs are relatively wide spread in and near these RMZs. Observations of this species have been made during multispecies surveys (see Volume II, Part K)

c) Activities with Potential for Impacts

Timber management is a covered activity with the potential for impacts to this species. Logging activities have the potential to cause adverse impacts through habitat modification, and possibly

siltation of breeding habitat. Other potential impacts to red-legged frogs include alteration of habitat; predation by fish and introduced bullfrogs (Hayes and Jennings 1988); possibly herbicides; pesticides; and acid rain (Nussbaum et al. 1983); and also potentially livestock grazing and habitat fragmentation (Federal Register/ Vol. 61, No. 101/23 May, 1996).

d) Mitigation Measures

The red-legged frog is a predominantly aquatic species generally associated with permanent and semi-permanent bodies of water, therefore riparian protection strategies are the most important mitigation for this species. Mitigations pertaining to avoidance and reduction of siltation of watercourses due to roads also apply. Suitable habitat for this species will be conserved in the Headwaters Reserve, and MMCAs.

e) Potential Impacts of the Incidental Taking

This species has a widespread distribution and large population numbers. The plan area represents a relatively small portion of the species' range and numbers. The proposed aquatic conservation measures and other riparian mitigations are likely to be sufficient to avoid take, or maintain incidental take at low levels.

f) Monitoring/Adaptive Management

As described in Volume IV, Part D (Section 2.3) PALCO proposes to implement an adaptive management process for this species as part of the watershed analysis. Information on habitat conditions and species distribution will be integrated during the synthesis portion of the analysis to develop customized prescriptions to provide for the needs of all List A aquatic species.

4. Rana boylei foothill yellow-legged frog

a) Natural History

The foothill yellow-legged frog is listed as a California species of special concern. In the coast range this species occurs from the Oregon border south to Los Angeles County from sea level to approximately 6,000' above sea level. This species is able to utilize a variety of habitat types, including: valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and wet meadow habitats (Zeiner et al. 1990a). In all habitats the species is seldom found far from small, permanent streams with banks that can provide sunning sites (Nussbaum et al. 1983, and Zweifel 1968). Breeding and egg-laying usually occurs over approximately two weeks, generally from March to May depending on water conditions, and follows the receding of flood waters (Zeiner et al. 1990a). Temperatures necessary to support the life history traits of this species in spring and early summer should be < 24^{o} to 27^{o} C (Kupferberg 1996). Important aquatic microhabitats include shallow, low velocity areas near gravel bars, and ground cover on stream banks (Kupferberg 1996, Lind et al. 1992). Substrate for egg laying and tadpole hiding cover is provided by interstitial spaces between cobbles and boulders in low gradient large stream segments, and large woody debris in side pools and channels (Kupferberg 1996, Lind et al. 1992). Avoiding disturbance of terrestrial habitat within approximately five meters of stream banks is beneficial in supporting important habitat features for this species (Kupferberg 1996). Declines in the number of this species in the foothills of the Sierra Nevada and in the San Joaquin Valley are believed to be both the result of habitat alteration, as well as predation and competition by introduced bullfrogs.

b) Baseline Condition

Incidental observations indicate that this species has a patchy distribution in the plan area. It is common in suitable habitat along major watercourses with relatively open, sunny banks such as the Eel River and Van Duzen River. PALCO records for foothill yellow-legged frogs are from the Eel WAA, Yager WAA, and Bear-Mattole WAA (Wroble and Waters 1989, PALCO unpublished data). On PALCO's ownership there are approximately 265 miles of Class I streams, corresponding to approximately 11,085 acres of RMZs, within the WAA's of the Plan Area, many of which contain the elements necessary to be suitable foothill yellow-legged frog habitat (Volume I, Table 2). Home ranges for this species are estimated to be less than 10 m in the longest dimension (Zeiner et al. 1990a). In areas of suitable habitat individuals and eggs can number from the hundreds to thousands. Observations of this species have been made during general biological surveys conducted as part of gravel operations.

c) Activities with Potential for Impacts

Gravel extraction operations, livestock grazing, effects on water quality due to sawmill or compost plant operations, and instream habitat projects are activities with the potential for impacts to this species. In addition, surveys or monitoring of this frog could include permitted scientific collection of individuals. The presence of equipment or animals on river bars could potentially impact adults or larvae. Changes in water quality could similarly cause adverse impacts. No habitat alteration is planned which would render habitat unsuitable for this species. It appears that bullfrogs, a predator and competitor, have not yet become a problem for yellow-legged frogs in the bioregion.

d) Mitigation Measures

The potential for impacts to this species will be minimized and mitigated through protection of riparian habitats, and through no conduct of gravel operations in the wetted channel. Riparian protection measures designed to provide cool water temperatures, clean gravel and cobble substrate, and large woody debris will be beneficial to this species. Instream habitat improvements are expected to have potential benefits for this species through efforts to enhance clean gravel spawning areas for salmonids.

e) Potential Impacts of the Incidental Taking

This species has a widespread distribution and large population numbers. The plan area represents a relatively small portion of the species' range and numbers. The proposed aquatic conservation measures and other riparian mitigations are likely to be sufficient to avoid incidental take, or constrain incidental take to low levels.

f) Monitoring/Adaptive Management

As described in Volume IV, Part D (Section 2.3) PALCO proposes to implement an adaptive management process for this species as part of the watershed analysis. Information on habitat conditions and species distribution will be inetgrated during the synthesis portion of the analysis to develop customized prescriptions to provide for the needs of all List A aquatic species.

B. Reptiles

1. *Clemmys marmorata marmorata,* northwestern pond turtle

a) Natural History

The northwestern pond turtle is a California species of special concern, and a California Fully Protected Species. The western pond turtle (C. mamorata) ranges from Puget Sound to Baja. In California, this species ranges from the Oregon border south to Kern County (Bury 1962). The specific habitat of this species includes a variety of permanent and ephemeral aquatic habitats such as ponds, lakes, rivers, marshes, sloughs, and drainage ditches (Zeiner et al. 1990a, Bury 1962, Holland 1994, and Nussbaum et al. 1983). Aquatic habitat has been described by Bury (1972) and Reese (1996) as water < 32°C and > 0.5m deep in near shore low or no velocity stream or river reaches. Large woody debris is important as basking sites and escape habitat (Bury 1972, Reese 1996, Holland 1994). Pond turtles may use terrestrial habitats for activities including over-wintering, aseasonal use, and overland dispersal (Holland 1994). At the minimum, pond turtles use terrestrial habitats for nesting (Rathburn et al. 1992, Reese 1996, Holland 1994). Females lay eggs from March to August. Female pond turtles typically excavate nest burrows in dry, compact soils high in clay or silt content. Distance of nests from aquatic habitat in one study ranged from three meters to over 402 meters (Holland 1994) and in another study averaged 50m (Reese 1996) The nesting areas tend to be on south or west facing slopes, vegetated by short grasses or forbs (Holland 1994). Hatchlings remain in the nest over the winter, and emerge in the spring.

b) Baseline Condition

The specific habitat of this species is relatively limited on the PALCO ownership. This species has been detected in or near some of the major watercourses on PALCO such as the Eel River and Larabee Creek. PALCO observations of this species have occurred in the Yager WAA, and the Eel WAA. We have no estimate of numbers of individuals, however, pond turtles appear to be present in low numbers in suitable habitat. There are approximately 265 miles of Class I watercourse in the Plan Area, corresponding to about 11,085 acres of Class I RMZs.

c) Activities with Potential for Impacts

Covered activities with the potential for impacts to pond turtles include: Gravel and rock extraction, timber management, road construction, grazing, and scientific surveys and studies. Some activities such as the felling of trees and yarding of logs, as well as movement of large rocks or logs during instream habitat improvement projects, have limited potential for impacts to this species. Gravel extraction may have very limited potential for impacts due to habitat modification. Use of ponds or slow portions of streams and rivers by livestock could have some very limited potential for habitat modification by decreasing water quality, or alteration of streambeds such that important refugia is damaged or lost.

d) Mitigation Measures

Protection of riparian habitats, including buffer zones on Class I watercourses, is likely to be the single most effective mitigation for this species. Most suitable pond turtle habitat occurs in the Channel Migration Zones of larger Class I watercourses. Riparian protection measures are designed to avoid impacts such as siltation which could cause indirect impacts to pond turtles, and will also largely protect the species from direct impacts at nest sites and overwintering sites. Other proposed mitigation includes large woody debris retention and recruitment which will

continue to provide basking sites; instream habitat improvement projects which may also include logs for basking sites and creation of increased pool habitat: and restriction of gravel extraction to outside the wetted channel such that potential habitat along the rivers is unlikely to be altered to an unsuitable state. Surveys and monitoring of habitat (as described below) is expected to identify key terrestrial habitat features.

e) Potential Impacts of the Incidental Taking

The plan area represents a relatively small portion of the species' range and numbers. The species occupies a somewhat specialized niche which is afforded protection in the plan. The riparian mitigations are likely to be sufficient to avoid impacts or maintain impacts at low levels.

f) Monitoring/Adaptive Management

As described in Volume IV, Part D (Section 2.3) PALCO proposes to implement an adaptive management process for this species as part of the watershed analysis. Information on habitat conditions and species distribution will be integrated during the synthesis portion of the analysis to develop customized prescriptions to provide for the needs of all List A aquatic species.

C. Birds

1. *Phalacrocorax auritus,* double-crested cormorant

a) Natural History

The double-crested cormorant is a California species of special concern. Like the brown pelican, pesticide residues have played a role in reduced reproductive success for the double-crested cormorant. This species formerly bred on coastal cliffs and offshore islands from Marin County in northern California to La Jolla in San Diego County, and in interior northeastern California, the Sacramento Valley, the San Joaquin Valley, and the Salton Sea (Grinnell and Miller 1944). Some nesting colonies in California have also been abandoned due to disturbance or habitat elimination (Remsen 1978). On the north coast the species has increased over the past 15 years (Harris 1996). Breeding Bird Survey results indicate that the species is increasing in the Pacific states and throughout the west (Sauer et al 1997). Although this species may forage inland on the lower reaches of the coastal rivers, it nests and roosts on the coastline.

b) Baseline Condition

According to Harris (1996) this species is a common resident and breeder. This is the only cormorant which is seen flying to and from foraging areas along the Eel and Van Duzen Rivers. There are no inland nesting records (Harris 1996). There are no known nesting areas on PL property (LeValley per. comm., Hewitt per. comm.). Foraging habitat in the Plan Area includes the more open segments of the approximately 265 miles of fish-bearing watercourse miles in the Plan Area (Volume I, Table 2).

c) Activities with Potential for Impacts

Covered activities with the potential for indirect impacts to this species include timber management and gravel and rock extraction. No direct impacts to this species are anticipated since it does not nest inland. There is low potential for impacts through harvest of perch trees along the river corridors, and also possibly from gravel extraction operations which may prevent cormorants from foraging in limited areas.

d) Mitigation Measures

The aquatics conservation strategy (Volume IV Part D) will mitigate potential impacts to foraging habitat, and includes the maintenance and recruitment of perch trees adjacent to foraging areas. Gravel operations are restricted to outside wetted channels, therefore disturbance of foraging cormorants is unlikely. Surveys for this species will occur as part of gravel extraction and reconnaissance level surveys. Information which is collected on habitat conditions and species distribution will be reported to the USFWS and CDFG. In the unlikely event that nests are discovered in an area slated for operations, the USFWS and CDFG will be consulted for protective measures.

e) Potential Impacts of the Incidental Taking

The double-crested cormorant is not currently known to nest in the plan area. Potentially suitable habitat along river corridors makes up a relatively small portion of the overall range of this species. Riparian protection measures, and mitigation proposed for gravel operations indicates that incidental take will not occur, or that levels will be very low.

f) Monitoring/Adaptive Management

Monitoring for this species will continue through bird surveys conducted on the PALCO gravel bars and the reconnaissance level surveys for osprey and eagles. Since there are no known nests of this species in the Plan area at this time, this is the only form of monitoring planned. However, if cormorant rookeries or individual nests are located in the future, the protection measures developed through consultation will be monitored for compliance and effectiveness. Data gathered shall be reported to the USFWS and CDFG.

2. Ardea herodias, great blue heron

a) Natural History

The great blue heron is a Board of Forestry sensitive species as per 14 CCR 895.1, and also a CDFG "Special Animal". Most importantly it is the rookeries of this species which are considered sensitive by the resources agencies. Great blue heron populations were decimated across North America by the millinery trade during the late nineteenth and early twentieth centuries (Palmer 1962). Once this trade was outlawed, the population began to recover. Breeding Bird Survey results indicate that the species is increasing in much of California, including the extreme northwestern portion, but that there have been decreases in coastal areas south of Cape Mendocino (Sauer et al 1997). In California this species ranges throughout most of the state up to approximately 4,900' above sea level, with rookeries scattered throughout northern California (Zeiner et al. 1990b). Great blue herons inhabit a wide variety of freshwater and salt water habitats. Foraging areas include coastal bays, lagoons, tidal flats, mud flats, and rocks along rivers, creeks, ponds, and lakes (Yocom and Harris 1975) and also agricultural lands and along watercourses in mountainous areas.. Its diet consists of fish, frogs, salamanders, lizards, snakes, shellfish, and insects. It fishes both night and day, with most of its activity around dawn and dusk. Their rookeries are often found in brush, on rocks and ledges, or on the ground, but they prefer groves of trees near feeding areas (Zeiner et al. 1990b). The great blue heron typically breeds during the months of March - May. A nest usually consists of a clutch of 3-7 eggs, chicks fledge at about two months.

b) Baseline Condition

Great blue herons are commonly seen foraging on the rivers and large creeks in the Plan Area. Much of the 265 miles of Class I streams in the Plan Area are potentially suitable foraging habitat for this species. Observations include all WAA's. There are no large rookeries of this species found on PALCO lands. Rarely individual nests, or a small aggregation of nests have been located along river corridors during THP layout or other wildlife surveys. It is possible that other sightings of this species are of individuals flying to and from foraging areas. Observations of this species have been made during avian surveys conducted as part of gravel operation monitoring (see Vol. VI Part I).

c) Activities with Potential for Impacts

Gravel and rock extraction, and timber management are covered activities with the potential for adverse impacts to great blue herons. Harvest of nest trees could have the potential for adverse impacts to this species. Gravel operations could also cause impacts through alteration of foraging habits or locations.

d) Mitigation Measures

Maintaining timber near foraging areas is recommended to maintain great blue heron habitat (Schlorff 1978). Riparian protection, including standards for maintenance of canopy along watercourses, and maintenance of habitat diversity through time are the general mitigations for this species. Specific mitigation for individual nest sites or rookeries will be provided through the application of the following measures: a seasonal buffer of a 300' radius from the nest tree or trees shall be implemented during the critical period (March 15 through July 15). Following the critical period, or fledging of young, limited harvest is allowed in the buffer zone (such as thinning or selection). The nest trees and screening trees shall be left. These default measures may be altered to fit site specific conditions (ie mitigating topographic features) through consultation with USFWS or CDFG. Surveys for this species will occur as part of gravel extraction and reconnaissance level surveys. Information which is collected on habitat conditions and species distribution will be reported to the USFWS and CDFG

e) Potential Impacts of the Incidental Taking

The great blue heron is a relatively common and widespread species. The Plan Area is a small portion of the overall range. Potentially suitable habitat in the Plan Area makes up a relatively small portion of the overall habitat of this species. Riparian protection measures, and specific nest site protection measures indicate that adverse impacts will likely not occur, or that levels of such impact will be very low.

f) Monitoring/Adaptive Management

Monitoring for this species will continue through bird surveys conducted on the PALCO gravel bars, and reconnaissance level surveys for eagles and osprey. Since there are no known rookeries of this species in the Plan Area at this time, this is the only form of monitoring planned. However, if heron rookeries or individual nests are located in the future, the protection measures above will be monitored for compliance and effectiveness. Data gathered shall be reported to the USFWS and CDFG.

3. Casmerodius albus, great egret

a) Natural History

The great egret is a California fully protected species, a Board of Forestry sensitive species as per 14 CCR 895.1, and also a CDFG "Special Animal". Most importantly it is the rookeries of this species which are considered sensitive by the resources agencies. In California, the range of great egrets is widespread throughout the state except at high elevations, and in desert areas (Brown et al. 1986). The specific habitat of this species is nearly synonymous with that of the great blue heron, with the two species often foraging and breeding in close proximity. Great egrets return to communal, often mixed species, roost trees every evening, and leave during daylight hours for foraging grounds. Nesting generally occurs high in a tree, with a clutch of 3 eggs. This species raises one brood a year (Ehrlich et al. 1988). After severe population declines around the turn of the century due to the harvest of their feathers, populations have rebounded, and the species is now considered a common resident and locally common breeder (Harris 1991, 1996). A combination of plumage trade early in the century and organochlorine pesticides later on, brought this species close to extinction. Since both have been outlawed the population has been increasing. Breeding Bird Survey results indicate that the species is increasing throughout its range in the western US, which is limited to portions of California, southern Oregon, and Nevada (Sauer et al 1997).

b) Baseline Condition

The major breeding area in the bioregion is on Indian Island in Humboldt Bay, where up to 200 pairs have nested in recent years (Harris 1996). No rookeries are known on PALCO, so it is possible that sightings of this species are also of individuals flying to and from foraging areas. Low numbers of great egrets (generally one to three) are seen foraging along the Eel or Van Duzen Rivers during the spring and summer. Groups of 10 or 20 may often be seen among grazing cattle in winter months when prey includes pocket gophers, voles, or other small mammals.

c) Activities with Potential for Impacts

Timber management activities and gravel and rock extraction operations have the potential for impacts through removal of perch sites and disturbance at foraging areas. Adverse impacts to this species are not expected as they do not appear to nest or forage in areas of the Plan landscape where operations would possibly occur.

d) Mitigation Measures

As with the great blue heron, maintaining timber near foraging areas is recommended to maintain great egret habitat (Schlorff 1978). It is unlikely that adverse impacts could occur to this species as a result of harvest under the Plan as protection of watercourses will retain roosting and nesting substrate near foraging areas. If a rookery is found in the Plan Area in the future, PALCO will apply the following measures: a seasonal buffer of a 300' radius from the nest tree or trees shall be implemented during the critical period (March 15 through July 15). Following the critical period, or fledging of young, limited harvest is allowed in the buffer zone (such as thinning or selection). The nest trees and screening trees shall be left. These default measures may be altered to fit site specific conditions (ie mitigating topographic features) through consultation with USFWS or CDFG. Surveys for this species will occur as part of gravel extraction and reconnaissance level surveys. Information which is collected on habitat conditions and species distribution will be reported to the USFWS and CDFG.

e) Potential Impacts of the Incidental Taking

The great egret is a relatively common and widespread species. The Plan Area is a small portion of the overall range. Potentially suitable habitat in the Plan Area makes up a relatively small portion of the overall habitat of this species. Riparian protection measures, and specific nest site protection measures indicate that adverse impacts will not occur, or that impact levels will be very low.

f) Monitoring/Adaptive Management

Monitoring for this species will continue through bird surveys conducted on the PALCO gravel bars, and reconnaisance level surveys for eagles and ospreys. Since there are no known rookeries of this species in the Plan Area at this time, this is the only form of monitoring planned. However, if egret rookeries or individual nests are located in the future, the protection measures above will be monitored for compliance and effectiveness. Data gathered shall be reported to the USFWS and CDFG.

4. *Egretta thula,* snowy egret

a) Natural History

The snowy egret is a California fully protected species, and a CDFG "Special Animal". Most importantly it is the rookeries of this species which are considered sensitive by the resources agencies. In California this species ranges throughout most of the state, but is not normally found in the northern one-fourth (Small 1974). As with the great egret, the snowy egret has increased in the bioregion apparently due to a combination of nesting and foraging opportunities becoming available (Harris 1996). This species has a very patchy breeding distribution in the western US. Breeding Bird Survey results indicate that the species is increasing in California, but population performance has been mixed in other portions of the range (Sauer et al 1997). Breeding habitat for snowy egret is considered to be wetland areas with open water. The snowy egret nests along the coast in colonial situations, such as on Indian Island. There are no inland nesting records. The snowy egret does not forage inland among cattle as do the great and cattle egrets (Harris 1996). These birds feed mainly on aquatic insects but also eat reptiles, amphibians, fish and small mammals.

b) Baseline Condition

The major breeding area in the bioregion is on Indian Island in Humboldt Bay. No nests have been known to exist away from Humboldt Bay. No snowy egret rookeries are known to occur on PALCO, and we have no observations on PALCO lands.

c) Activities with Potential for Impacts

Timber management and gravel and rock extraction are activities with the potential for impacts to this species. Although no observations of this species have been recorded on PALCO lands, there is the possibility that breeding or foraging activities could occur on the inland rivers at some future time. If this were the case, impacts could potentially occur through harvest of perch or nest trees, or through gravel extraction disturbing foraging areas.

d) Mitigation Measures

Mitigation for this species will include maintenance of habitat diversity over time, riparian

protection, and application of the following measures should a rookery be located in or adjacent to a THP area: a seasonal buffer of a 300' radius from the nest tree or trees shall be implemented during the critical period (March 15 through July 15). Following the critical period, or fledging of young, limited harvest is allowed in the buffer zone (such as thinning or selection). The nest trees and screening trees shall be left. These default measures may be altered to fit site specific conditions (ie mitigating topographic features) through consultation with USFWS or CDFG. Surveys for this species will occur as part of gravel extraction and reconnaissance level surveys. Information which is collected on habitat conditions and species distribution will be reported to the USFWS and CDFG.

e) Potential Impacts of the Incidental Taking

The snowy egret is a relatively common and widespread species. The Plan Area is a small portion of the overall range. Potentially suitable habitat in the Plan Area makes up a relatively small portion of the overall habitat of this species. Riparian protection measures, and specific nest site protection measures indicate that adverse impacts will not occur, or that impact levels will be very low.

f) Monitoring/Adaptive Management

Monitoring for this species will continue through bird surveys conducted on the PALCO gravel bars, and reconnaisance level surveys for osprey and eagles. Since there are no known rookeries of this species in the Plan area at this time, this is the only form of monitoring planned. However, if egret rookeries or individual nests are located in the future, the protection measures above will be monitored for compliance and effectiveness. Data gathered shall be reported to the USFWS and CDFG.

5. *Nycticorax nycticorax,* black-crowned night heron

a) Natural History

The black-crowned night heron is a CDFG "Special Animal". Most importantly it is the rookeries of this species which are considered sensitive by the resources agencies. This species has a very patchy breeding distribution in the western US. Breeding Bird Survey results indicate that the species is decreasing in many portions of its range, but is increasing in California, Nevada, and Oregon (Sauer et al 1997). In California, this species ranges the length of the state (Small, 1974). In the bioregion black-crowned night herons forage on the sloughs, ponds, and mudflats of Humboldt Bay, and also on the major river estuaries and ditches of pastures on the Eel River bottoms (Harris 1996). Since this species is nocturnal, it feeds at night on fish, frogs, crustaceans, small mammals, and young of other waterbirds. This heron nests in dense tree foliage or brush near aquatic or emergent feeding areas (Zeiner et al. 1990b). Most local nesting areas are near the shoreline. It lays 3 or 4 eggs between February and March and again between June and July. Young fledge at 6 to 7 weeks. Winter roosts occur in different areas than nesting colonies, often inland near residential areas. Migration occurs in large flocks almost exclusively at night.

b) Baseline Condition

As with the other herons and egrets, Indian Island is an important local breeding area. No rookeries of this species are known to occur on PALCO, so it is possible that occasional sightings of this species are of individuals flying to and from foraging areas. We have no observations from inland forested areas which could be proposed for harvest.

c) Activities with Potential for Impacts

Timber management activities have limited potential for impacts to this species. Logging activities could potentially affect this species if it were to nest or roost further inland than currently known. Impacts could occur through harvest of nest trees, or other modification of habitat. The possibility of any impacts is extremely low given current conditions (apparent absence of the species in areas slated for operations).

d) Mitigation Measures

Protection of riparian areas will include protection of foraging habitat. The following measures shall be applied should a rookery be located in or adjacent to a THP area: a seasonal buffer of a 300' radius from the nest tree or trees shall be implemented during the critical period (March 15 through July 15). Following the critical period, or fledging of young, limited harvest is allowed in the buffer zone (such as thinning or selection). The nest trees and screening trees shall be left. These default measures may be altered to fit site specific conditions (ie mitigating topographic features) through consultation with USFWS or CDFG. Surveys for this species will occur as part of gravel extraction and reconnaissance level surveys. Information which is collected on habitat conditions and species distribution will be reported to the USFWS and CDFG.

e) Potential Impacts of the Incidental Taking

The black-crowned night heron is a relatively common and widespread species. The Plan Area is a small portion of the overall range. Potentially suitable habitat in the Plan Area makes up a relatively small portion of the overall habitat of this species. Riparian protection measures, and specific nest site protection measures indicates that adverse impacts will not occur, or that impact levels will be very low.

f) Monitoring/Adaptive Management

Monitoring for this species will continue through bird surveys conducted on the PALCO gravel bars, and reconnaissance level surveys for eagles and osprey. Since there are no known rookeries of this species in the Plan Area at this time, this is the only form of monitoring planned. However, if heron rookeries or individual nests are located in the future, the protection measures above will be monitored for compliance and effectiveness. Data gathered shall be reported to the USFWS and CDFG.

6. Pandion haliaetus, osprey

a) Natural History

The osprey is a California fully protected species, a California species of special concern, a Board of Forestry sensitive species in accordance with 14 CCR 895.1, and as a U.S. Department of the Interior species of special emphasis. The range of this species in California is the northern portion of the state where their nest sites are associated with large fish-bearing bodies of water. Most of these birds undergo a seasonal migration, with most leaving by early October, with some birds remaining for the winter at major foraging areas. Spring migrants arrive at nesting areas by early March, with nesting underway by late May (Harris 1991). Typical habitat consists of large elevated trees or artificial structures for nesting within a few kilometers of a fish source (Johnsgard 1990). Contamination of prey by organochloride pesticides were mainly responsible for population declines, and since the banning of these pesticides in the U.S. the reproductive success of most populations has increased (Evans 1982). Although ospreys are most often very

tolerant of human activity and often nest adjacent to roads and other conspicuous locations, disturbance of nest sites during the nest season (April-early October) may cause nest abandonment.

b) Baseline Condition

Ewins (1997) concluded that North American breeding populations of ospreys in the 1980s-1990s appear to be relatively healthy and still increasing in most of their range, following the declines caused by pesticide contaminants during the 1950s-1970s. In the north coast region this species is a common summer resident and breeder; but rare in winter (Harris 1991, 1996). Ospreys are relatively common during the breeding season on areas of this ownership along the Eel River and some of its tributaries. Elk River near Eureka is also an area common to osprey, where a loose colony of nest sites exists. As stated in the CWHR species note (Zeiner et al. 1990b.), the osprey uses large trees, snags, and dead-topped trees in open forest habitats for cover and nesting. Osprey tend to return to the same nest areas each year, and their nest sites are generally known and mapped for consideration in harvest planning. According to PALCO observation records and CDFG records there are approximately 63 osprey nests (either historic or active) on or immediately adjacent to PALCO property (See Map 35, Volume 5). Observations of this species have been made during avian surveys conducted as part of gravel operation monitoring (see Vol. VI Part I).

c) Activities with Potential for Impacts

Timber management activities have the potential for adverse impacts to this species through nest disturbance or harvest of inactive or unknown nest trees.

d) Mitigation Measures

Active nest sites in THP areas or adjacent to THP areas will be protected by buffers up to 18 acres in size. All designated nest, perch, and screen trees will be left standing and unharmed during the nesting season, or until it has been determined the young have fledged. After the nesting season, or when young have fledged, the nest zone may be harvested, although the nest tree shall be left. Burning of units for site preparation shall be done outside the nesting season, and measures such as firelines, foaming, or others to protect the nest tree shall be taken. The nest tree, especially if it is a snag, may still burn. PALCO, at its option, may propose the construction of an artificial nest structure. Watercourse protection zones and retention and recruitment of snags as proposed in the plan will provide nest and perch trees into the future. The Headwaters Reserve and MMCAs will conserve suitable nesting habitat for ospreys. Surveys for this species and monitoring of nest sites in conjunction with harvest planning are likely to track all historic and active nests through time.

e) Potential Impacts of the Incidental Taking

The Plan Area is a relatively small portion of this species overall range and distribution. Measures to maintain habitat and avoid impacts make the possibility of adverse impact very low.

f) Monitoring/Adaptive Management

The surveys described above in the bald eagle discussion (general reconnaissance surveys) will serve as monitoring for osprey. Known sites and any other new nest sites found during the life of the permit will be periodically monitored during the nesting season to determine if the nest is

active, or if the default mitigations are effective. Data gathered shall be reported to the USFWS and CDFG.

7. *Haliaeetus leucocephalus,* bald eagle

a) Natural History

The bald eagle is listed as a California endangered species, a California fully protected species, a federally threatened species, and a sensitive species pursuant to 14 CCR 895.1. In California, bald eagles breed in the northern quarter of the state. The species winters throughout most of their breeding range, with half of the state's population wintering in the Klamath Basin (Zeiner et al. 1990b). Nests in large, usually predominant trees with relatively open crown structure. Builds large conspicuous stick nest normally just below the upper branches, unlike the osprey which usually builds on top of the uppermost tree branches. Breeding season for bald eagles is February through July. Clutch size is usually two (Zeiner et al. 1990b.).

b) Baseline Condition

The species is a rare to uncommon resident and locally rare breeder, with coastal populations appearing to have increased in the past twenty years (Harris 1996). In winter on the north coast the bald eagle is often seen in trees with open crowns near large creeks, rivers, or lakes which have a fish supply, and also around the bay where waterfowl congregate. Declines in the populations of this species began in the 1950's due mainly to pesticide contamination, but also because of habitat loss or alteration, and disturbance. In California the breeding population was severely reduced in size by the early 1960's (Lehman 1983). Since then, most populations have increased, and winter populations appear stable (Johnsgard 1990). There are no current or historic nest site records for the PALCO ownership. Entering birds are rare to relatively common depending on water conditions along Yager Creek, and the Eel, Elk, and Van Duzen Rivers. Wintering bald eagles have also been seen along lower Larabee Creek, near its confluence with the Eel River. PALCO observations are from the Yager WAA, Eel WAA, and Humboldt WAA. Sightings on PALCO are during the winter period, generally between November and March, and coincide with runs of anadromous fish. The spawned out carcasses of dead salmonids seem to be an easily obtained source of food for the wintering birds, and when the carcasses are available bald eagles may be present. Observations indicate that numbers of wintering bald eagles can be variable, but that from three to seven birds may be seen in the Yager WAA, and one to two in both the Eel and Humboldt WAA's. Map 31 is a conservative estimation of the potential foraging areas of wintering bald eagles. There are approximately 265 miles of fish-bearing watercourses in the Plan Area (Volume I, Table 2) of which the potential bald eagle foraging areas are some subset.

c) Activities with Potential for Impacts

Logging activities and gravel extraction activities have the potential for disturbing foraging activities of the wintering birds. For bald eagles to reach their breeding areas in the best possible physical condition their wintering needs must be met. Although the potential for impacts to wintering birds is very low, some possibilities exist, for example the potential for collisions with yarder cables strung across Class I watercourses. Noise or other disturbance which causes an eagle to flush from a fish carcass or other prey is the primary form of impact possible. There is also the possibility that, under the right circumstances, there may be a bald eagle nesting attempt on the PALCO ownership in the future, and disturbance of adults or young at nest sites would become a concern.

d) Mitigation Measures

Watercourse protection zones and the retention of large trees for woody debris and snag recruitment will serve to provide perches for foraging eagles. These same mitigation measures are proposed to maintain, and enhance conditions for the prey species of the wintering birds. In the event that bald eagles attempt to nest in the plan area, it is anticipated that these measures will also provide suitable nesting substrates.

Special measures will be implemented to avoid and minimize impacts to wintering bald eagles and nest sites.

Measures for Wintering Bald Eagles

When operating in or adjacent to known or potential foraging habitat as shown on Map 31 during the period when wintering bald eagles occur in the Plan area (generally between 15 November and 15 February), PALCO will adhere to the following measures.

1. Skyline cables over Class I streams will be marked to reduce the probability of collisions. The procedure for marking skyline cables will be approved by the USFWS or CDFG.

2. Designated field personnel (Licensed Timber Operator, Registered Professional Forester, or wildlife biologist) will be trained to recognize and survey for bald eagles. The training procedure will be approved by USFWS or CDFG.

3. Known or potential foraging habitat adjacent to THP will be surveyed each morning prior to harvest operations. A survey protocol will be approved by USFWS or CDFG.

4. If bald eagles are present adjacent to the THP, there will be no active operations within the WLPZ or within 100' of the WLPZ while eagles are present.

Measures for Nesting Bald Eagles

1. Annual reconnaissance surveys. PALCO will conduct annual reconnaissance level surveys to identify watersheds where THP specific surveys are needed. The surveys will consist of visits to observation points along roads or other viewing locations which cover the areas depicted as known or potential foraging habitat on Map 23. The surveys will be conducted during the pre-breeding season (February 15 to March 15). Observation points along the transects will be established no greater than 0.5 miles apart. Surveyors will spend a minimum of ten minutes at each station, and search for bald eagles and other raptors using binoculars, or a spotting scope if necessary. Transects will be run a minimum of three times each, with two runs occurring in the morning (sunrise to 1100), and one in the afternoon/evening.(l400 to sunset). At least one run for each transect must be conducted in March. All pertinent observations will be recorded. If reconnaissance level surveys are negative, no THP specific surveys are needed. If eagles are detected during the March survey, THP level surveys and actions will be initiated.

2. THP level surveys and actions. If there is a Class I stream within 1.0 mile of the THP, surveys will be conducted to detect any nesting eagles within 0.5 miles of the THP boundaries. If bald eagles are not detected, no protective measures are warranted. If nesting bald eagles are detected:

a) Seasonal no harvest buffers around nests will be maintained during the breeding season (January 15 to August 15, or post fledging); the default buffers will be a distance of 0.5-mile radius from the nest tree. Where mitigating topographic features or other site specific circumstances may warrant a change in the default buffers, PALCO will consult with the USFWS or CDFG.

b) If there are nesting eagles more than 0.25 mile but less than 0.50 mile from the THP boundaries, a PALCO wildlife biologist will observe the nest for at least one hour during each of the first three days of timber operations to determine if operations are adversely affecting nesting. Indications of disturbance include agitated movements, frequent calling, adults taking flight, or nestlings left unprotected for extended periods of time (>10 minutes).

c) A 500' radius buffer area of limited harvest shall be implemented post breeding season. Harvest shall be limited to the period between 15 August and 31 October, unless it can be shown that the nest has failed or young have fledged. Harvest within the 500' radius will be limited to prescriptions which will enhance long term eagle habitat; such as: precommercial or commercial thinning, selection, or an alternate prescription.

d) Any other site specific management measures will be developed in consultation with USFWS and CDFG.

e) Potential Impacts of the Incidental Take

The bald eagle occurs in very low levels in the plan area. The plan area is a relatively small portion of the overall range of this species. Measures to protect wintering birds, locate and protect nests, and other mitigation proposed indicates that adverse impacts will not occur, or that the levels of impact will be very low.

f) Monitoring/Adaptive Management

Currently there are no known nests of this species on PALCO lands. Therefore, the THP and annual reconnaissance level surveys described above will serve as monitoring for bald eagles. If a nest is found as a result of the surveys, the protection measures will be monitored for compliance and effectiveness. Data gathered shall be reported to the USFWS and CDFG.

8. Accipiter striatus, sharp-shinned hawk

a) Natural History

The sharp-shinned hawk is a California species of special concern. The species breeds throughout most forested regions of North America. In California, the range of this species is from the Oregon border south to central California during the breeding season, otherwise throughout the state from September to April (Small 1974). Both the breeding and wintering habitats of this species have been characterized as woodlands of young or open forests with a variety of plant life forms (Johnsgard 1990). Sharp-shinned hawks generally nest in forests with high foliage density, but in smaller size classes than Cooper's hawks and goshawks (USFWS unpublished data). Remsen (1978) suggested that timber harvest may be a threat to nesting habitat of this species, but the work of other authors indicates that forest harvest resulting in younger stands benefit the species (Postovit and Postovit 1987, Reynolds et al. 1982). Sharp-shinned hawks use fragmented forests as well as unbroken forest (Reynolds 1989).

b) Baseline Condition

Harris (1991, 1996) calls the sharp-shinned hawk a common migrant and winter visitor; and an uncommon summer resident and breeder. Populations of this species may have declined from 1950-1970 due to the use of organochloride pesticides, but have since improved (Evans 1982, Johnsgard 1990). Breeding bird surveys indicate increases in numbers throughout the Pacific states (Sauer et al 1997). There is no total population estimate for the Plan Area. Infrequent incidental observations during the breeding season on PALCO lands indicate that sharp-shinned hawks are present in low numbers, and are not a common breeder. PALCO observations of this species have been from the following WAA's: Humboldt, Yager, and Bear Mattole. These are all winter period records. We have no documented nesting records. Currently there are approximately 4,267 acres of hardwood habitats potentially suitable for sharp-shinned hawks, as well as extensive acreage of unthinned second growth and other mixed species forest which appear to be suitable for nesting.

c) Activities with Potential for Impacts

Covered activities with the potential for impacts to this species are related to timber management. Logging activities have the potential for impacts through habitat modification, and nest disturbance at unknown nest sites. Because the species appears to prefer dense stands, thinning may negatively affect nesting habitat, while clearcutting can remove potential habitat (Reynolds 1989). The potential for impacts is low given the apparent low level of nesting in the Plan Area.

d) Mitigation Measures

Nesting habitat provided across the landscape and along riparian corridors (RMZs) will be maintained throughtime, and a mix of forest successional stands through the life of the Plan will include types used for nesting by prey species of this accipiter (See Volume III, Part C). The Headwaters Reserve and MMCAs will conserve potential nesting and foraging habitat for the sharp-shinned hawk. During the first five years of the ITP PALCO will survey for sharp-shinned hawks in approximately 10% of the total proposed THP acreage, comprised of a representative sample of the habitats involved. Methodology similar to that reported by Mosher and Fuller (1996) or Rosenfield et al (1988) will be used. Broadcast calls of species such as great-horned owls will not be used within 0.5 miles of known spotted owl sites. Training of foresters and technicians in identification of sharp-shinned hawks and their nests will be conducted to minimize impacts in unsurveyed THPs. A 500' operational buffer will be implemented around active nests in or adjacent to a THP. Harvest of the buffer (with the exception of the nest tree) outside of the nesting season, or following a determination that the young have fledged, is authorized. Following the first five years of surveys, a predictive model will be developed using information collected to guide future surveys.

e) Potential Impacts of the Incidental Taking

The Plan Area is a relatively small portion of this species overall range and distribution. The lack of occurrence of nest sites indicates that the potential for impacts is very low. Protection of all located nest sites during the nesting season, and provision of suitable nesting habitat further reduces potential impacts.

f) Monitoring/Adaptive Management

Currently there are no known nests of this species on PALCO lands. Therefore, THP level surveys will serve as monitoring for sharp-shinned hawks. If a nest is found as a result of the

surveys, the protection measures will be monitored for compliance and effectiveness. Data gathered shall be reported to the USFWS and CDFG.

9. Accipiter cooperi, Cooper's hawk

a) Natural History

The cooper's hawk is a California species of special concern. This species breeds and winters throughout much of North America. In California, this species ranges throughout the state, but is not common in the northwest and southeast (Small 1974). Cooper's hawks nest in a wide variety of timbered habitats, and often uses second growth stands (Reynolds 1989). Nesting habitat usually consists of stands with high foliage density, but may include fragmented stands (Reynolds 1989). Incidental sightings on this ownership corroborate this assessment. Nesting habitat of this species in central California is most frequently in dense stands of live oak (Asay 1987) deciduous riparian stands, and other forested habitats near water (Zeiner et al. 1990b.). The status of this species in the state seems to be in question, as Remsen (1978) observed that breeding populations have decreased (possibly due to habitat alteration or pesticide contamination). However, densities of active nests in oak woodlands in central California are among the highest reported for the species (Asay 1987). Cooper's hawks forage chiefly on small to medium sized birds, such as quail. They prefer dense stands of live oaks, riparian deciduous, or other various forest habitats that are near water. Dense cover is important for the ambush style hunting exhibited by this hawk. They commonly nest in crotches of hardwood trees or conifers, building a stick nest which may be lined with bark (Zeiner et al. 1990b.. Breeding takes place March through August with the peak activity being May through June. A single clutch of two to six eggs is laid. This hawk may compete to a certain extent with sharp-shinned hawks for breeding and roosting habitat.

b) Baseline Condition

No population estimates are available for California. Breeding Bird Survey results indicate that the species has been declining throughout the Pacific states for the past 30 years (Sauer et al 1997). In the north coast region they are an uncommon resident, more regularly seen in winter, and breed sparingly throughout (Harris 1991, 1996). PALCO observations are recorded for the Van Duzen, Yager, Eel, and Bear Mattole WAA's. We have one recorded nest site in the Van Duzen WAA. The nest site was found as a result of a spotted owl survey. Currently there are approximately 4,267 acres of hardwood habitats potentially suitable for Cooper's hawks, as well as extensive acreage of second growth mixed forests. This species has been observed during avian surveys conducted as part of the multispecies project (Vol. II Part K).

c) Activities with Potential for Impacts

Timber management related activities could potentially impact this species. Logging activities could cause impacts through habitat modification, or disturbance of unknown nest sites. Because the species prefers denser stands, thinning may negatively affect nesting habitat, while clear cutting is likely to remove habitat (Reynolds 1989).

d) Mitigation Measures

Mitigation measures for this species will include maintenance of habitat diversity over time (Volume III, Part C), hardwood retention, riparian protection, and the Headwaters Reserve and MMCAs which will conserve potential habitat. During the first five years of the ITP PALCO will survey for Cooper's hawks in approximately 10% of the total proposed THP acreage, comprised

of a representative sample of the habitats involved. Methodology similar to that reported by Mosher and Fuller (1996) or Rosenfield et al (1988) will be used. Broadcast calls of species such as great-horned owls will not be used within 0.5 miles of known spotted owl sites. Training of foresters and technicians in identification of Coopers hawks and their nests will be conducted to minimize impacts in unsurveyed THPs. A 500' operational buffer will be implemented around active nests in or adjacent to a THP. Harvest of the buffer (except for the nest tree) shall occur outside of the nesting season, or after it has been determined that young have fledged. Following the first five years of surveys, a predictive model will be developed using information collected to guide future surveys.

e) Potential impacts of the Incidental Taking

The Plan Area is a relatively small portion of this species overall range and distribution. The lack of occurrence of nest sites indicates that the potential for impacts is very low. Protection of all located nest sites during the nesting season and provision of suitable nesting habitat will further reduce potential impacts.

f) Monitoring/Adaptive Management

Currently there has been only one known nest of this species on PALCO lands. Therefore, THP level surveys will serve as monitoring for Cooper's hawks. If a nest is found as a result of the surveys, the protection measures will be monitored for compliance and effectiveness. Data gathered shall be reported to the USFWS and CDFG.

10. *Accipiter gentilis,* northern goshawk

a) Natural History

The northern goshawk is a California species of special concern, a Board of Forestry sensitive species pursuant to 14 CCR 895.1, and a Forest Service Sensitive species. The USFWS is currently conducting a status review to determine whether the northern goshawk should be proposed for listing under the ESA (62 Federal Register 50892). The range of this species in California is throughout the state, with most nests having been observed in conifer stands inland from the coastal strip (Hall 1984). Throughout the world-wide range of this species there is great diversity in the habitats selected for nesting. Throughout North America the goshawk nests in coniferous forests. An essential characteristic for nesting habitat is the presence of an adequate diurnal prey base such as ground squirrels and grouse. Many nest sites in California have been located by timber marking crews or failers (Bloomet al 1986). The goshawk forages for birds from robin to grouse size, and small mammals of squirrel to rabbit size (Zeiner et al. 1990b.). Snags, dead topped-trees, and large downed logs may be used for plucking posts or hunting observation points. Nests are often in crotches of trees, or trees with structural defects. About 700 nest sites have been located in California, but only one nest site is known in the redwood region (USFWS unpublished data). The CWHR model for this species assigns redwood forest a low habitat suitability index (Goshawk Working Group 1995). Redwood dominated stands seem to lack an adequate diurnal prey base, and in many instances have forest floors covered by thick, and often tall brush such as evergreen huckleberry *(Vaccinium* ovatum) which are likely to inhibit the foraging capabilities of this bird. However, relatively high suitability ratings are given for mid to late seral Douglas-fir and Montane Hardwood Conifer habitats.

b) Baseline Condition

In a recent review of published literature and analyses of demographic data, Kennedy (1997)

concluded that there is no evidence of range contractions in western North America, and there is no strong evidence to support the contention that the goshawk is declining in the US as a whole. In the bioregion Harris (1996) refers to the northern goshawk as a rare resident and breeder, sparsely distributed in the coastal mountains in mixed conifer hardwood and pure conifer forests. No nests of this species have been located to date on this ownership. Incidental sightings seem to generally corroborate Harris's (1996) observation that post-breeding dispersal by juveniles generates reports in the coastal lowlands in fall and winter. Of the 6 observations on or near PALCO land, 3 were off property, 1 was in the Allen Creek MMCA, 1 was in the Headwaters Reserve and 1 was in the Bear-Mattole WAA. Surveys for the northern goshawk in a variety of forested habitats, with emphasis on what is currently understood as potentially suitable nesting habitat, were conducted on PALCO lands from 1993-1995, with negative results. These surveys occurred in each of the five named WAAs. Both broadcast call and stand search methods have been used, following the USFS protocol (USDA 1992). More recent surveys have incorporated changes and suggestions from the Goshawk Working Group document (Buckberg et al 1995). Approximately 5,258 acres have been surveyed (See Map 34, Volume V), in the following habitats: 780 acres of young forest, 433 acres of mid-seral conifer and hardwoods, 305 acres of residual forest, 1,100 acres of second growth redwood and Douglas-fir, and 1,976 acres of mixed old growth redwood/Douglas-fir and old growth Douglas-fir/hardwood. Approximately 664 of the surveyed acres were in non-forest types, covered incidentally to the habitat being surveyed. Surveys have been concentrated in areas where sightings of this species have been made, or in habitats though to be potentially suitable. Again, as a result of surveys to date, no nests have been located, and no additional sightings were generated. Further surveys are planned for the Bear-Mattole WAA this year (1998).

c) Activities with Potential for Impacts

Timber management related activities are covered activities with the potential for impacts. Although the species persists in areas with an extensive history of timber harvest (Woodbridge and Detrich 1994, Hargis et al 1994) including managed industrial timberlands (Farber, et al 1998, timber harvest activities can adversely affect the species through habitat modification and disturbance of nesting activity. Woodbridge and Detrich (1994) found that small nest groves were less likely than larger stands to be re-occupied during successive years, suggesting that fragmentation may have negative effects.

d) Mitigation Measures

Maintaining habitat diversity through time, snag retention and recruitment, hardwood retention, downed log retention, and large woody debris retention and recruitment are all general mitigations which will maintain essential habitat elements of this species or its potential prey. Surveys of THP areas in habitats of potentially high suitability (i.e. Douglas-fir, hardwood, or Montane Hardwood Conifer in the Bear-Mattole WAA) will follow Goshawk Working Group (1995) guidelines. Broadcast calls of goshawks will not be used within 0.5 miles of a northern spotted owl activity center. During the first five years of the permit period, all THPs in the Bear-Mattole WAA shall be surveyed. A training program for foresters and technicians involved in THP work shall be conducted to enable these field crews to recognize and protect goshawk nests, both in the Bear-Mattole WAA and all other WAAs. If a nest site is found in or within 1,000' of a THP area, a 1,000' radius protective buffer will be maintained around the nest site during the nesting season or until 30 days after the young have fledged. Following the nest season or after the young have fledged the buffer may be harvested. Following the first five years of the ITP, either a reduced survey regime will be implemented, or a predictive habitat model produced to direct future surveys. The Headwaters Reserve and MMCAs will conserve potential habitat. In the Bear-Mattole WAA potential habitat will be conserved in RMZs, NSO retention areas, and across the landscape

through time as shown on Maps 21-24. This includes at least 10% late seral habitat per WAA.

e) Potential Impacts of the Incidental Taking

The Plan Area is a relatively small portion of this species overall range and distribution. Past survey efforts for nest sites indicate that, given the very low probability of encountering a nest of this species in a THP area, the potential for impacts is very low.

f) Monitoring/Adaptive Management

Currently there are no known nests of this species on PALCO lands. Therefore, the surveys described above will serve as monitoring for goshawks. If a nest is found as a result of the surveys, the protection measures will be monitored for compliance and effectiveness. Data gathered shall be reported to the USFWS and CDFG.

11. *Buteo regalis,* ferruginous hawk

a) Natural History

The ferruginous hawk is a California species of special concern. Harlow and Bloom (1989) reported that the species was believed to be declining in much of its breeding range due to loss of grassland breeding habitats. However, in 1992 the USFWS evaluated a petition to list the ferruginous hawk under the ESA, and concluded that the petitioner did not present sufficient information to indicate that the action was warranted. At that time, the USFWS found that breeding populations were probably increasing (57 Federal Register 37507). The ferruginous hawk breeds in the Great Basin and northern prairie states. One breeding site was located in Modoc County, California in the 1980's, but otherwise the species is believed to be strictly a wintering species in California (Harlow and Bloom 1989). The ferruginous hawk is a diurnal foraging species, making low searching flights over open areas for rabbits, mice, ground squirrels, and other prey. During winter visits to the bioregion this hawk roosts and forages in open pasture lands (Harris 1996). Stick nests are built on cliffs, cut banks, and trees, among other structures.

b) Baseline Condition

On the north coast of California this buteo is a locally rare winter visitor (Harris 1996). During the winter months it may be seen perched low in trees in open pastures. There are no breeding records for California (Zeiner et al. 1990b.). There are two PALCO observations, in the Eel WAA and Van Duzen WAA. There have been sightings of an individual in the Van Duzen WAA in more than one year. Wintering birds generally arrive in California in September and depart by mid-April (Zeiner et al. 1990b.). There are approximately 3,836 acres of prairie habitats currently distributed throughout the Plan Area (Volume I, Table 2).

c) Activities with Potential for Impacts

Timber management is likely to be the only set of covered activities with the potential to impact this species. Logging activities could potentially disrupt winter foraging activities, possibly causing adverse impacts. The potential for this happening is quite low, given the very low numbers of the bird which may occur in the Plan Area, and the type of habitat used for foraging, which does not overlap with potential harvesting areas.

d) Mitigation Measures

Maintenance of habitat diversity over time, including prairie habitats, is the general mitigation for this species. Since the ferruginous hawk does not nest in the Plan Area, and operations will not significantly impact wintering habitat, it is unlikely to be adversely impacted by operations under the Plan.

e) Potential Impacts of the Incidental Taking

The Plan Area is a relatively small portion of this species overall range and distribution. Since the ferruginous hawk is not known to nest within hundreds of miles of the Plan Area, and operations will not significantly impact wintering habitat, it is likely that adverse impacts will be avoided, or levels of impacts would be very low.

f) Monitoring/Adaptive Management

Currently there are no known nests of this species on PALCO lands, or in northwestern California. Therefore, the surveys described above (general reconnaissance surveys and burrowing owl surveys) will serve as monitoring for ferruginous hawks. If a nest is found as a result of the surveys, consultation will be conducted with the USFWS and CDFG to develop protection. Protection measures will be monitored for compliance and effectiveness. Data gathered shall be reported to the USFWS and CDFG.

12. Aquila chrysaetos, golden eagle

a) Natural History

The golden eagle is a California species of special concern, a California fully protected species, and is a Board of Forestry sensitive species pursuant to 14 CCR 895.1. The range of golden eagles in California is throughout the state, scarce in the southeastern desert region, and they are found in rolling country with lightly wooded areas, savannahs, grasslands, desert edges, farms, or ranches (Small 1974). Golden eagles take jackrabbits and other mammals on the wing, will also prey on reptiles, birds, and also feed on carrion. The golden eagle nests in large stick nests on cliffs or large trees in open areas. Nests are quite conspicuous, often up to ten feet in diameter and three feet high (Zeiner et al. 1990b.). Breeding season is late January through August. Clutch size is 1-3, averaging 2. Nestling period is 65-70 days (Zeiner et al. 1990b.). Overall population densities of this species currently appear stable.

b) Baseline Condition

The species is a rare to uncommon resident and breeder (Harris 1991, 1996). The species winters south to the northern Mexico highlands (Ehrlich et al. 1988). The overall breeding densities of this species are relatively low, due to territorial spacing of nesting and foraging habitats. In the Plan Area potential golden eagle habitat occurs primarily in the mixed prairie, hardwood, and Douglas-fir interface, predominantly in the Bear-Mattole WAA. There are currently approximately 3,836 acres of prairie habitat in the Plan Area (Volume I, Table 2). Bear River ridge is a common place of occurrence on the north coast (Harris 1991), which is partially on this ownership. Infrequent incidental observations are generally recorded at Bear River Ridge, Rainbow Ridge, and Long Ridge (Taylor Peak) areas, and occasionally other more inland ridge top prairies. PALCO observations are from the Yager WAA, Bear Mattole WAA, Eel WAA, and Humboldt WAA. There is one unconfirmed nesting record from the Eel WAA in the Larabee Creek drainage.

c) Activities with Potential for Impacts

Logging of nest trees, or disturbance of nest sites by logging activities have the potential for impacts to this species.

d) Mitigation Measures

Maintaining habitat diversity over time is likely to provide nesting habitat as well as habitat for prey species of the golden eagle. Guidelines for snag retention and recruitment will contribute to the maintenance of potential nest trees. Surveys and nest site protection are as follows:

1. When a THP is proposed in potentially suitable nesting habitat for this species (for example in the mixed prairie, Douglas-fir, and hardwood habitats of the Bear-Mattole WAA), a staff wildlife biologist will survey the THP area and surroundings for evidence of nesting. The THP area and a 0.25 mile buffer will be surveyed for ground based operations, or a 0.5 mile buffer for helicopter operations. Ground based surveys shall consist of three survey visits between 15 January and 1 March. Surveys shall occur in the morning prior to 1100 hours, or in the afternoon after 1400 hours, and shall have a minimum two hour duration. Surveys shall occur at least five days apart, and will not be conducted during inclement weather. Surveys from aircraft may take the place of the ground based surveys.

2. If a nest is found in or adjacent to an area proposed for harvest, buffer zones will be implemented as follows:

   a) Seasonal no harvest buffers around nests will be maintained during the breeding season (January 15 to August 15, or post fledging); the default buffers will be a 0.5-mile radius from the nest tree. Where mitigating topographic features or other site specific circumstances may warrant a change in the default buffers, PALCO will consult with the USFWS or CDFG.

   b) If there are nesting eagles more than 0.25 mile but less than 0.50 mile from the THP boundaries, a PALCO wildlife biologist will observe the nest for at least one hour during each of the first three days of timber operations to determine if operations are adversely affecting nesting. Indications of disturbance include agitated movements, frequent calling, adults taking flight, or nestlings left unprotected for extended periods of time (>I0 minutes).

   c) A 500' radius buffer area of limited harvest shall be implemented post breeding season. Harvest shall be limited to the period between 15 August and 31 October, unless it can be shown that the nest has failed or young have fledged. Harvest within the 500' radius will be limited to prescriptions which will enhance long term eagle habitat; such as: precommercial or commercial thinning, selection, or an alternate prescription.

   d) Any site specific protection measures other than defaults above will be developed in consultation with USFWS and CDFG.

e) Potential Impacts of the Incidental Take

The golden eagle occurs in very low levels in the plan area. The plan area is a relatively small portion of the overall range of this species. Measures to locate and protect nests, along with other mitigation proposed indicates that adverse impacts are unlikely.

f) Monitoring/Adaptive Management

Currently there are no known nests of this species on PALCO lands. Therefore, the THP surveys described above will serve as monitoring for golden eagles. If a nest is found as a result of the surveys, the protection measures will be monitored for compliance and effectiveness. Data gathered shall be reported to the USFWS and CDFG.

13. *Falco peregrinus anatum,* American peregrine falcon

a) Natural History

The peregrine falcon is listed as a California endangered species, a California fully protected species, a federal endangered species, and is a sensitive species in accordance with 14 CCR 895.1. In California, the species breeds and winters throughout the state, with the exception of desert areas. The specific habitat of this species is tall cliffs for nest and perch sites with protection from mammalian predators and the weather, most often close to water and adequate prey populations. Breeding season is generally March to late August. Clutch size can be 3-7 eggs, usually 34 (Zeiner et al. 1990b.). Successful pairs will fledge 2.2 to 2.5 young (Monk 1981).

b) Baseline Condition

In the north coast region peregrines are an uncommon migrant and winter visitor; a rare, local breeder (approximately three to five sites in the bioregion), and summer resident (Harris 1991, 1996). DDT pesticides were responsible for drastically reducing the breeding populations of this species. Restrictions on the use of this pesticide, and recovery efforts have resulted in breeding range expansion. Local (north coast) breeders may have continued to have problems with reproductive success, possibly due to pesticide residues in migrant prey species (Zeiner et al. 1990b., Pagel pers. comm.). There is a known historic nest cliff site on this ownership which is adjacent to the Eel River, although this site may have been damaged or eliminated during the winter of 1995 due to failure of the rock face.

c) Activities with Potential for Impacts

There have been numerous consultations with the CDFG regarding this one nest site (mentioned above) in relation to proposed THP's adjacent to, or in the general vicinity of the nest site. Due to the location and aspect of the nest cliff, potential impacts due to logging activity are confined to noise disturbance. Gravel extraction may occur at some time on river bars owned by PALCO upriver from the nest cliff approximately one half mile. The potential for disturbance due to the gravel operations is very low. The Holmes Bluff eyrie was historically located above a railroad tunnel which has moderate activity during some periods of the year. The bluff is also located above a portion of the Eel River which receives moderate to high levels of use by water recreation enthusiasts during spring and summer months.

d) Mitigation Measures

The following mitigation strategy shall be followed to avoid adverse impacts:

1. For THPs greater than or equal to 0.5 miles from the Scotia Bluffs or Holmes Bluff, and any other cliffs identified as potential nest sites, no site specific surveys, monitoring, or consultation are needed.

2. For THPs < 0.5 mile from the Scotia Bluffs or Holmes Bluff, and any other cliffs identified as potential nest sites, apply default mitigations, or monitor for occupancy each year during the breeding season (January 15 to August 15). Default mitigations shall be applied until monitoring allows other determinations developed in consultation with USFWS or CDFG.

3. Default mitigation includes a disturbance buffer of 0.25 miles of no harvest for tractor or cable yarding operations, or 0.5 miles for helicopter yarding operations. The disturbance buffers shall be applied during the January 15 to August 15 breeding period.

4. Site specific measures to avoid impacts may be applied to the Scotia Bluffs or Holmes Bluff sites, and any other cliffs identified as potential nest sites, in consultation with USFWS or CDFG. An example of this type of mitigation is the restriction on the use of "jake brakes" on a portion of the county road north of Holmes Bluff during the breeding season.

5. Lifting of the default mitigations or other site specific restrictions can be accomplished through monitoring and the determination that the site is not occupied, that nesting is not occurring, has failed, or that the young have fledged. Monitoring shall be conducted by a qualified biologist and follow the guidelines in Pagel (1992) "Protocol for Observing Known and Potential Peregrine Falcon Eyries in the Pacific Northwest".

6. The RPF, Staff Wildlife Biologist, or their designee shall explain to the person or persons responsible for the conduct of the timber operations the physical and temporal nature of any default or site specific restrictions.

Besides specific nest site protection measures, other mitigation for this species will include riparian protection zones in the vicinity of the eyrie (when applicable), and maintenance of habitat diversity, which are likely to be positive impacts to potential prey species of the peregrine falcon.

e) Potential Impacts of the Incidental Take

The peregrine falcon occurs in very low levels in the plan area. The plan area is a relatively small portion of the overall range of this species. Measures to protect nests, and other mitigation proposed indicates that adverse impacts are highly unlikely.

f) Monitoring/Adaptive Management

The Holmes Bluff and Scotia Bluff sites, and any other new nest sites found during the life of the permit will be periodically monitored during the nesting season to determine if the nest is active, or if the default mitigations are effective. Data gathered shall be reported to the USFWS and CDFG at five year intervals.

14. Charadrius alexandrinus nivosus, western snowy plover

a) Natural History

The western snowy plover is a federally threatened species, and a California species of special concern. On the Pacific Coast the western snowy plover population has been known to breed in loose colonies primarily on coastal beaches from southern Washington to Baja (USFWS 1995). This plover nests in shallow depressions in sand and gravel generally from April through August. The nesting season has been described as 15 March to 15 September (Federal Register 50 CFR Part 17 Vol. 60 No. 41). Clutch sizes range from 2-6, with an average of 3 eggs (Zeiner et al. 1990b.). The precocial young are able to forage with the adults within one day. Feeding consists

of gleaning insects and other small prey from beaches and wet sandy areas.

b) Baseline Condition

Harris (1996) refers to this plover as an uncommon local migrant and winter visitor; rare, local breeder, declining in numbers. Recent avian surveys have found that this bird also nests inland on river bars in this area, in the bioregion for this plan from the Eel River Delta upstream to at least the mouth of the Van Duzen River (Hewitt pers. comm. 1996). Surveys on five PALCO gravel bars have occurred in 1996 and 1997. Each bar is visited three times between May and July (generally one visit per month), for a total of 30 surveys to date. One to two survey transects are conducted, depending on the size of the gravel bar. Only highly experienced avian surveyors, with specific experience with snowy plovers, are employed. There have been no detections of snowy plovers on any of the five PALCO gravel bars. Also refer to Volume VI, Part 1, Gravel Extraction Reports for more information on the river bars.

c) Activities with Potential for Impacts

Activities such as off-road vehicle use, gravel extraction, and other gravel bar use may cause impacts such as nest disturbance. Because PALCO conducts gravel extraction activities and maintains summer crossings on portions of its ownership along the Eel and Van Duzen Rivers it has conducted avian surveys and other monitoring in the affected areas. To date there have been no detections of snowy plovers or their nests. Livestock grazing along the river corridors also has some minor potential for impacts. It is also possible that surveys and monitoring of this species may have some potential for nest disturbance.

d) Mitigation Measures

Protection of riparian zones and other limitations on gravel operations are likely to maintain suitable habitat for this species, although it may not be used because it is too far inland. It is anticipated that periodic monitoring (such as described above) will continue for river bar activities. The surveys generally occur each year during the nesting season of the western snowy plover (15 March to 15 September). If snowy plovers are detected, the individual(s) shall be observed for evidence of nesting behavior. If a nest site is discovered, a 1,000' seasonal operations buffer will be applied until the end of the breeding season, or until it is determined that the nest has failed, or nesting has been completed.

e) Potential Impacts of the Incidental Taking

Those portions of the plan area along the river bars represent a small portion of the range and potential habitat of this species. Proposed measures to monitor and protect this species if found will avoid take or result in extremely low levels of incidental take, if any.

f) Monitoring/Adaptive Management

Monitoring for this species will continue through bird surveys conducted on the PALCO gravel bars. Since there are no known nests of this species in the Plan area at this time, this is the only form of monitoring planned. However, if snowy plover nests are located in the future, the protection measures will be monitored for compliance and effectiveness. Data gathered shall be reported to the USFWS.

15. Speotyto cunicularia, burrowing owl

a) Natural History

The burrowing owl is a California species of special concern. The conversion of open grasslands to agriculture, and also poisoning of ground squirrels are thought to be reasons for population declines (Zeiner et al. 1990b.). This owl is a yearlong resident of dry grasslands, desert habitats, and other grass-forb and shrub habitats. It was formerly common throughout the state in suitable habitats, excluding the humid northwest coastal forests and high mountains (Zeiner et al. 1990b.). The burrowing owl usually nests in old burrows of ground squirrels or other small mammals of similar habitats. Breeding occurs March through August. This owl is semi-colonial. Clutch size ranges from 2-10, averaging 5-6 (Zeiner et al. 1990b.).

b) Baseline Condition

On the north coast it is a locally rare migrant and winter visitor (Harris 1996). There are no nesting records for the region (Harris 1996). There are no PALCO observations of this species. There are approximately 3,836 acres of prairie habitat in the Plan Area (Volume I, Table 2) which may have some potential for suitability for the burrowing owl.

c) Activities with Potential for Impacts

Road building through prairie habitats as part of logging activities, and also livestock grazing, have the potential to impact the nest sites of this species.

d) Mitigation Measures

The following mitigation strategy will be followed for burrowing owls:

1. Where roads are to be constructed through prairies, conduct surveys during both the wintering and nesting seasons, unless the species is detected on the first seasonal survey. The winter survey should be conducted between December 1 and January 31. Nesting season surveys should be conducted between April 15 and July 15. Surveys should be conducted from two hours before sunset to one hour after, or from one hour before to two hours after sunrise. Surveys should effectively cover all suitable burrowing habitat within 50 meters of the road alignment. If surveys are positive, the road shall be designed and constructed to avoid nest burrows by at least 50 meters. Construction must not disturb an occupied burrow during the nesting season (February 1 through August 31) unless a qualified wildlife biologist approved by the USFWS or CDFG verifies through non-destructive methods that either: (1) the owls have not yet begun egg laying and incubation; or (2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival.

2. If surveys are negative but burrowing owls are detected during construction, operations within 50 meters of the nest site shall be avoided until any nestlings are fledged or until August 31, whichever occurs first. After this point, PALCO will notify the USFWS and CDFG and attempt to trap any owls using the burrows to avoid killing them by construction activities. The owls will then be released following construction activities.

e) Potential Impacts of the Incidental Taking

The burrowing owl is not currently known to nest in the plan area. Potentially suitable habitat

makes up a relatively small portion of the overall range of this species. Measures to protect nests, and other mitigation proposed indicate that adverse impacts, if any, are highly unlikely, or that such impacts will be very low.

f) Monitoring/Adaptive Management

Currently there are no known nests of this species on PALCO lands. Therefore, the THP level surveys described above will serve as monitoring for burrowing owls. If a nest is found as a result of the surveys, the protection measures will be monitored for compliance and effectiveness. Data gathered shall be reported to the USFWS and CDFG.

16. Chaetura vauxi, Vaux's swift

a) Natural History

The Vaux's swift is a California species of special concern. The range of this species in California is the length of the state in migration, and breeding in a narrow coastal belt from Del Norte County south to Santa Cruz County (Small 1974). Specific habitat for this species includes hollow trees, snag-tops with cavities, and also chimneys for nests and roosts. Research has shown a preference for nest trees ≥ 20", averaging 26.57" (Bull and Cooper 1991, Bull and Hohmann 1993). Dead trees, hollow trees with heartwood decay, and broken-topped trees are preferred (e.g. Bull and Cooper 1991). Besides naturally occurring cavities, Vaux's swifts will also use cavities excavated by pileated woodpeckers (Bull and Cooper 1991, Lundquist and Mariani 1991). Vaux's swifts feed primarily on leafhoppers, aphids, whiteflies (Homoptera), flies (Diptera), and mayflies (Ephemeroptera) (Bull and Beckwith 1993). Foraging habitat generally consists of ponds and streams, grasslands, and to a lesser extent, forested habitat (Manuwal 1991, Bull and Beckwith 1993). Breeding season is from early May to mid-August. Vaux's swifts build nests on the inner wall of large snags or hollow trees. Clutch size ranges from 3-7 eggs.

b) Baseline Condition

On the north coast the species is considered a common summer resident and breeder; casual in winter (Harris 1991, 1996). Vaux's swifts are commonly seen in suitable habitat on the PALCO ownership. This species was detected in late successional habitat during surveys conducted under the multi-species work. This swift is known from the Humboldt, Yager, Bear Mattole, and Eel WAAs where their specific habitat element of snags and large hollow trees are found. In particular, surveys conducted for marbled murrelets in the Headwaters Reserve and MMCAs indicate that these areas are heavily used by this species. There are approximately 26,105 acres of old growth and residual habitat which is potentially suitable for Vaux's swifts (Volume IV, Part B, Marbled Murrelet Conservation Plan). However, because this species uses the individual habitat components (large snag or hollow topped trees), there is a great deal of potentially suitable habitat scattered throughout the Plan Area.

c) Activities with Potential for Impacts

The removal of old, decadent redwoods and Douglas-firs with hollow snag-tops through timber management activities can cause loss of nesting habitat for this species. Nest disturbance could occur during the breeding season when harvest occurs in suitable habitat. Based on habitat association alone, the harvest of old growth and residual stands could cause adverse impacts to habitat for this species if specific habitat elements were not left. Approximately 17,127 acres of the old growth and residual potential habitat of this species will be available for harvest (Volume IV, Part B, Marbled Murrelet Conservation Plan). (This figure does not take into account those

acres in RMZs, NSO habitat retention areas, and other areas unavailable for harvest).

d) Mitigation Measures

Bull and Hohmann (1993) have suggested that retaining live and dead hollow trees in logged stands will maintain nesting habitat for Vaux's swifts. Maintaining habitat diversity over time (including late seral), snag retention and recruitment, hardwood retention, large woody debris recruitment, and riparian protection will all be mitigation for this species through the retention of its specific habitat elements. Tree retention requirements as proposed in the aquatics conservation strategy and snag retention and recruitment strategy are highly likely to maintain specific habitat elements for this species; including hollow topped trees and goosepens (hollow bases of trees generally created by fire scars). The Headwaters Reserve and MMCAs will conserve high quality habitat for this species (approximately 12,317 acres, see Volume IV, Part B).

e) Potential Impacts of the Incidental Taking

The Vaux's swift is relatively common in the plan area. Harvest of suitable habitat outside of the Headwaters Reserve and MMCAs is likely to remove a portion of Vaux's swift habitat. However, measures to retain and recruit snags, and habitat conservation areas including the Headwaters Reserve and MMCAs will maintain high quality habitat for this species, indicating that levels of impact will be very low.

f) Monitoring/Adaptive Management

Monitoring for Vaux's swift habitat will occur in two ways: their presence in set-aside areas will be investigated during marbled murrelet monitoring surveys; and their specific habitat elements will be monitored during snag retention and recruitment monitoring. The effectiveness of the snag retention and recruitment strategy will also serve **as** a measure of the effectiveness of recruitment of nest trees for this species. The data gathered will be compiled, analyzed, and reported in five year intervals.

17. *Dryocopus pileatus,* pileated woodpecker

a) Natural History

This species has no listing status, but is considered sensitive to timber harvest due to potential removal of snags and downed logs which are essential habitat for this species. This large woodpecker excavates cavities for nesting in large (approximately 20" d.b.h.) snags. Mellen et al. (1992) described breeding habitat as late successional coniferous or deciduous forest, > 70 years old. Nest tree characteristics in various studies have included Diameter at Breast Heights (d.b.h.) of 22", 27", 33", and 38", and heights of 66', 89', 92', and 135' (Bull 1987, Aubry and Raley 1992, Mellen 1987, and Conner et al. 1975). In these same studies, the percentage of nest trees which were snags ranged from 55% to 100%. Breeding season is from early March to early July. Clutch size ranges 3-5, and this species may renest if the nest is disturbed early in the incubation period (Zeiner et al. 1990b.). Stands used for roosting generally showed > 60% canopy cover at roost sites (Bull et al. 1992, Bull 1995). Foraging areas have been described as forests > 40 years old, and also riparian areas (Bull 1995). Foraging sites include downed logs, dead trees, live trees, and stumps. Pileated woodpeckers have been shown to forage on dead wood up to 96% of the time (Mannan 1984). Some common predators of the pileated woodpecker include: the northern goshawk, red-tailed hawks, great homed owls, barred owls, martens, and gray fox.

b) Baseline Condition

According to Harris (1996) they are a rare to uncommon resident and breeder. This species ranges throughout the mountainous forests of northern and central California. PALCO observations are known from the Yager WAA, Bear Mattole WAA, Eel WAA, and Humboldt WAA. The species is probably more widespread as anecdotal observations attest. There are currently about 60,000 acres of late seral and old growth habitat available for pileated woodpeckers Volume I, Table 2).

c) Activities with Potential for Impacts

Harvest of large snags during timber management activities could potentially cause impacts to this species through habitat modification, or disturbance of undetected nest sites.

d) Mitigation Measures

Measures proposed as part of the plan to retain and recruit snags, wildlife trees, and downed logs, as well as retention of late seral habitat in set-asides and property-wide as part of habitat diversity will be beneficial to this species. Impacts to this species as a whole is unlikely given the mitigation measures proposed.

e) Potential Impacts of the Incidental Taking

The pileated woodpecker's habitat in the plan area is a relatively small portion of its overall range. Measures to retain and recruit snags, and habitat set-asides which maintain habitat for this species indicates that adverse impacts will be avoided, or any levels will be very low.

f) Monitoring/Adaptive Management

Monitoring for pileated woodpecker habitat will occur in two ways: their presence in set-aside areas will be investigated during marbled murrelet monitoring surveys; and their specific habitat elements will be monitored during snag retention and recruitment monitoring. The effectiveness of the snag retention and recruitment strategy will also serve as a measure of the effectiveness of recruitment of nest, roost, and forage trees and logs for this species. The data gathered will be compiled, analyzed, and reported in five year intervals.

18. *Progne subis,* purple martin

a) Natural History

The purple martin is a California species of special concern. In California, the range of purple martins is throughout the state west of the desert regions from sea level to approximately 6,000' above sea level. Specific habitat of this species for breeding is abandoned woodpecker cavities in isolated tall trees or snags, man-made martin houses (Allen and Nice 1952) or on cliffs (Bent 1942). Nesting season is from April into August. Depending on nest site availability, purple martins may nest singly or colonially (Zeiner et al. 1990b.). Clutches average 4-5 eggs, and the purple martin may raise two broods in one year.

b) Baseline Condition

Harris (1991, 1996) lists this species as an uncommon summer resident and breeder. In the north coast region purple martins are most commonly observed on the coastal lowlands near river

mouths. Infrequent incidental observations of this species indicate that they are present, but possibly in very low numbers. PALCO observations are from the Bear Mattole, Humboldt, and Yager WAAs. The baseline habitat condition of this species is similar to that of Vaux's swifts and pileated woodpeckers, as discussed above.

c) Activities with Potential for Impacts

The situation for purple martins is very similar to that of Vaux's swifts, and other cavity nesting species. The removal of old, decadent redwoods and Douglas-firs with hollow snag-tops during timber management activities can cause impacts to the nesting habitat of this species. Nest disturbance could occur during the breeding season when harvest occurs in suitable habitat. Based on habitat association alone, the harvest of old growth and residual stands could adversely affect the habitat of this species if specific habitat elements are not left.

d) Mitigation Measures

Maintaining habitat diversity over time (including late seral), snag retention and recruitment, hardwood retention, large woody debris recruitment, and riparian protection will all be mitigation for this species through the retention of its specific habitat elements. Tree retention requirements as proposed in the aquatics conservation strategy and snag retention and recruitment strategy are highly likely to maintain specific habitat elements for this species; including hollow topped trees and goosepens. The Headwaters Reserve, and MMCAs will conserve habitat for this species.

e) Potential Impacts of the Incidental Taking

The purple martin's habitat in the plan area is a relatively small portion of its overall range. Measures to retain and recruit snags, and habitat set-asides which maintain habitat for this species indicates that adverse impacts will be avoided, or any levels will be very low.

f) Monitoring/Adaptive Management

Monitoring for purple martin habitat will occur in two ways: their presence in set-aside areas will be investigated during marbled murrelet monitoring surveys; and their specific habitat elements will be monitored during snag retention and recruitment monitoring. The effectiveness of the snag retention and recruitment strategy will also serve as a measure of the effectiveness of recruitment of nest trees for this species. The data gathered will be compiled, analyzed, and reported in five year intervals.

19. *Riparia riparia,* bank swallow

a) Natural History

The bank swallow is a California threatened species. Channelization, stabilization, and other alteration or disturbance of river banks which provide nesting habitat have resulted in population declines (Zeiner et al. 1990b.). The bank swallow is usually a colonial nester, digging nest holes in sandy banks or cliffs. The nesting areas are generally near rivers, streams, ponds, lakes, or the ocean. In California 70% to 80% of the population occurs along the Sacramento River, with one other colony known on the Smith River (Garrison et al. 1987). Nests are excavated in fine sandy loam, or silty loam soils (Garrison et al. 1987). The breeding season is from early May through July. Clutches average 4-5, and two broods in one season have been reported (Zeiner et al. 1990b).

b) Baseline Condition

On the north coast they are considered a rare migrant and locally rare breeder (Harris 1996). No nesting colonies are known on or near the PALCO ownership. There are approximately 265 miles of Class I watercourse miles in the Plan Area (Volume I, Table 2) although very few of the total miles may have the potential to be habitat for this species.

c) Activities with Potential for Impacts

Covered activities are highly unlikely to adversely impact this species. Road construction, improvement, or maintenance, for example bridge construction, has limited potential for impacts to this species.

d) Mitigation Measures

The following measures will be implemented for bank swallows:

1. PALCO shall try to prevent repeated attempts to nest in sand piles associated with gravel mining operations using netting or other means developed in consultation with USFWS or CDFG.

2. Known or encountered nesting colonies along streams will be avoided during May and June. Establish a 200' buffer around active nest colonies during the nesting season, or consult with the USFWS or CDFG to develop alternative mitigation measures.

3. Riparian management zones will minimize disturbance and other impacts to nest colonies which may be established in the future.

e) Potential Impacts of the Incidental Taking

The bank swallow is not currently known to nest in the plan area. Potentially suitable habitat in the plan area is a relatively small portion of its overall range. No alteration of river banks which could supply habitat for this species is proposed as part of the plan, making potential impacts to this species highly unlikely to occur. Measures to avoid nest areas, and other specific mitigation discussed above indicates that incidental take will be avoided, or levels will be very low.

f) Monitoring/Adaptive Management

Monitoring for this species will continue through bird surveys conducted on the PALCO gravel bars. Since there are no known nests of this species in the Plan area at this time, this is the only form of monitoring planned. However, if bank swallow colonies or individual nests are located in the future, the protection measures above will be monitored for compliance and effectiveness. Data gathered shall be reported to the USFWS and CDFG.

20. Dendroica petechia, yellow warbler

a) Natural History

The *D. p. brewsteri* and *D. p. sonorana* subspecies of the yellow warbler are California species of special concern. The breeding range of this species in California is the length of the state, excluding southeastern desert areas, and the higher mountains (Small 1974). This species' breeding distribution extends across much of North America. Breeding Bird Survey results

indicate that the species is decreasing in much of the Pacific Northwest and northern and central California (Sauer et al 1997). Breeding habitat for the yellow warbler consists of alder, cottonwood, and willow stands in riparian cover (Harris 1991).

b) Baseline Condition

In the north coast region this species is a locally common summer resident and breeder; common migrant; and casual in winter (Harris 1991, 1996). Infrequent incidental sightings of this species on the PALCO ownership are generally in areas of riparian and hardwood habitat, as described in the preceding paragraph, along the Eel River and some of its large tributaries. Observations of this species have been made during avian surveys conducted as part of gravel operation monitoring (see Vol. VI Part I) and during multispecies surveys (Vol. II Part K). A majority of the 265 miles of Class I streams in the Plan Area contain habitat potentially suitable for this species. Nests of this species are likely to be infrequently distributed in suitable habitat, although we have nopopulation estimate for the Plan Area.

c) Activities with Potential for Impacts

Timber management activities, gravel extraction activities on the river bars, and livestock grazing have low potential for impacts to this species.

d) Mitigation Measures

Maintenance of habitat diversity, hardwood retention, and riparian protection are the general mitigation measures for his species. Monitoring of avian species is expected to continue as part of gravel extraction operations, however, no harvest or alteration of the specific habitat of this species is proposed.

e) Potential Impacts of the Incidental Taking

Conservation measures which protect riparian vegetation will also protect the habitat of this species in the Plan Area.

f) Monitoring/Adaptive Management

Monitoring for this species will continue through bird surveys conducted on the PALCO gravel bars. No extraction activities will occur in the riparian vegetation. Protection measures will be monitored for compliance and effectiveness through continued surveys. Data gathered shall be reported to the USFWS and CDFG.

21. *Icteria virens,* yellow-breasted chat

a) Natural History

The yellow-breasted chat is listed as a California species of special concern. Declines in the populations of this species (especially in the southern portion of the state) are generally attributed to loss of riparian woodland, and cowbird nest parasitism (Remsen 1978). Breeding Bird Survey results indicate that the species is decreasing in the eastern US, but increasing in much of the west, including northern California (Sauer et al 1997). In California, yellow-breasted chats are found throughout the state in suitable habitat up to approximately 6,500' above sea level (Small 1974, Zeiner et al. 1990b). The specific habitat of this species is dense thickets of willow or other brushy tangles of riparian woodlands (Zeiner et al. 1990b, Small 1974).

b) Baseline Condition

In the north coast region they are considered a locally uncommon to common summer resident and breeder; and accidental in winter (Harris 1991). The status of the yellow-breasted chat on PALCO lands is similar to that of the yellow warbler. Infrequent incidental sightings of this species on the PALCO ownership are generally in areas of riparian and hardwood habitat, as described in the preceding paragraph, along the Eel River and some of its large tributaries. Observations of this species have been made during avian surveys conducted as part of gravel operation monitoring (see Vol. VI Part I). A low level of nesting of this species is also likely occurring in suitable habitat, though no numbers are available. The yellow-breasted chat is one of 37 species or subspecies which has been captured at the Yager Creek bird monitoring station, on Yager Creek near Carlotta, California. The Yager Creek station has been operated since 1994, and is one of approximately 50 stations operated by cooperators of the Klamath Demographic Network. The Klamath Demographic Network is a cooperative venture to monitor bird populations by census and demographic techniques in northern California and southern Oregon. The yellow warbler has not been captured at the station.

c) Activities with Potential for Impacts

Timber management activities, gravel extraction operations, and livestock grazing are covered activities with the potential for impacts.

d) Mitigation Measures

Maintenance of habitat diversity, hardwood retention, and riparian protection are the general mitigation measures for his species. Monitoring of avian species is expected to continue as part of gravel extraction operations, however, no harvest or alteration of the specific habitat of this species is proposed.

e) Potential Impacts of the Incidental Taking

Conservation measures which protect riparian vegetation will also protect the habitat of this species in the plan area.

f) Monitoring Adaptive Management

Monitoring for this species will continue through bird surveys conducted on the PALCO gravel bars. No extraction activities will occur in the riparian vegetation. Protection measures will be monitored for compliance and effectiveness through continued surveys. Data gathered shall be reported to the USFWS and CDFG.

D. Mammals

1. Arborimus porno, California red tree vole

a) Natural History

The red tree vole is a California species of special concern. The range of this species in California includes coastal forests in the humid fog belt (Jameson and Peters 1988) south to Sonoma County on the coast and to Mendocino County in the coastal mountains, and east to Trinity County (Maser 1966). They have been located at elevations of from 150-3,100' above sea level (Maser 1966). The habitat of this species predominantly includes the existence of Douglas-

fir trees, with grand fir, sitka spruce, and western hemlock also used (Meiselman 1987, Williams 1986). Some authors have suggested that this species is associated with old growth or fairly dense mature forest with large trees (Carey et al. 1991, Williams 1986). Meiselman (1996) described red tree vole nests **as** being in mature or old growth Douglas-fir forest (> 100 years old), with a mean nest tree of 115.9 cm (45.63") d.b.h.and 57 m (185') tall, in stands with > 93% canopy cover. However, habitat records reviewed by Maser (1966) suggested that this species also uses young second growth Douglas-fir trees 7"-15" DBH, and also habitats described as broken, isolated, and scattered by clearcuts, open grassland, bracken fern and cultivated fields; or 30-50 year old stands with a few interspersed older trees, but little evidence of dense forest. These observations by Maser (1966) corroborate information gathered by foresters and biologists on this ownership since 1988, which indicate the use of Douglas-fir stands of varying age.

b) Baseline Condition

PALCO opportunistic observations of this species (N = 90) collected during THP layout and other forestry and wildlife work, are widespread throughout all WAA's. Elevation of observations ranged from 60' to 3,340'. Of nest trees observed, d.b.h. ranged from 2" to 60". Red tree vole occurrence from the multi-species investigations are from the Humboldt, Yager, and Bear-Mattole WAAs. The red tree vole was considered to be a mid and late seral/old growth associate via the multi-species work. Historical evidence based on the PALCO ownership and other managed lands in the north coast region would seem to indicate that, although much of the original forest was clearcut and burned in the early decades of the century, in some cases many times in an effort to convert forest land to pasture, red tree voles presently have a wide spread, yet patchy distribution. The patchy distribution seems to be related to the similar distribution of mesic habitats dominated by Douglas-fir. Where redwood is the dominant species, the nests of this species become much harder to locate. There are currently approximately 147,452 acres of mid-seral, late seral, and old growth habitat potentially suitable for red tree voles in the Plan Area (Volume I, Table 2).

c) Activities with Potential for Impacts

Timber management, road construction, and scientific surveys and studies are covered activities with the potential to impact red tree voles. Williams (1986) concluded that clearcuts, fires, construction of roads or powerlines and other activities creating openings reduce and fragment habitat and therefore may be detrimental to red tree voles. Impacts of habitat modification, through the harvest of nest trees are logging activities with the potential for impacts. Some permitted scientific collection of individuals has occurred through pit-trapping as part of multi-species surveys for this and other species.

d) Mitigation Measures

PALCO has obtained the appropriate scientific collecting permits prior to trapping red tree voles during past studies, and will continue to do so if needed during the permit period. Projections for mid and late seral habitat on the ownership, combined with riparian buffer condition will be adequate to sustain the species through the plan period over the Plan Area landscape(see Volume II Part C and Volume IV Part D). In addition, the Headwaters Reserve and the MMCAs contain currently suitable habitat and other habitat which will be managed such that it will become suitable red tree vole habitat during the life of the permit. No species specific mitigation measures are needed.

e) Potential Impacts of the Incidental Taking

The red tree vole is relatively common and widespread in the plan area. Projections for the

occurrence and distribution of this species' habitat throughout the plan period indicate that adequate suitable habitat will be present.

f) Monitoring/Adaptive Management

Compliance monitoring for this species will be accomplished through inventory of forest seral types and riparian buffers. Effectiveness of the mitigation will be monitored through establishment of the presence of the species in the set-asides and other stands on the landscape. Data gathered on the habitats of this species will be reported in five year intervals.

2. *Martes americana humboldtensis,* Humboldt marten

a) Natural History

The Humboldt marten is a California species of special concern. The State of California continues to classify the marten as a furbearer, but has not had an open season since 1952 (Ruggiero et al. 1994). The range of martens (Martes americana) in California includes the Sierra Nevada, Cascades, and north coast ranges in red fir, lodgepole and Ponderosa pine, subalpine, and redwood forests (Ingles 1965, Self and Kerns 1992). This includes the Sierra Nevada subspecies M.a. *sierrae.* In the Sierra Nevada the marten has shown a strong preference for CWHR Sierran Mixed Conifer 4D or larger (Zielinski et al. 1995). Also in the Sierra, log density, log volume, snag volume, and snag basal area were all higher at marten detection sites than at sites where marten were not detected (Laymon et al. 1993). Little information exists on the status of the subspecies *M.a. humboldtensis.* The subspecies was first described by Grinnellet al (1937). The boundaries of the subspecies range was drawn by Grinnell et al (1937) on the basis of habitat change, and went from Del Norte and eastern Siskiyou County along the eastern border of Humboldt County down into Mendocino and Sonoma Counties. The Humboldt marten was described by Grinnell et al 1937 as "decidedly darker, of richer golden brown tone" than M. *a. sierrae,* with "far less orange-yellow color on the throat and chest". There are also differences in the skulls of the subspecies (Grinnellet al 1937). Essential habitat elements of *Martes* americana include trees, rock piles or talus slopes, or snags for resting, foraging and breeding, and the presence of food; including Douglas tree squirrels, flying squirrels, voles, and also various species of berries.

b) Baseline Condition

Recently a trailmaster camera set photographed a marten on the extreme eastern margin of the historic range of *M.* a. *humboldtensis* (Slauson et al. 1996). The photograph, and previously collected tracks, represent the most western verifiable detection since martens were trapped near Smith River, California in the late 1940's (Slauson et al. 1996). Trapping records from 1919-1924 indicate that martens historically occurred in the bioregion (Zielinski and Golightly 1996). It is possible that first trapping, then timber harvest, and finally the range expansion of the Pacific fisher may have drastically reduced or eliminated the Humboldt marten from its historic range (Zielinski and Golightly 1996). *Martes* americana is a species predicted to occur in late successional habitat by the CWHR model, likely because of their need for large trees or snags with cavities and other structure (Zeiner et al. 199Oc). Humboldt marten have not been detected as yet by trailmaster cameras being used as part of the multi-species survey work. In 1995 and 1996 there were approximately 2,000 camera nights with no marten detections. Additional surveys during the winter of 1997-1998 also had negative results with respect to marten detections. Humboldt marten have not been detected on the PALCO ownership in the past by sooted track plate surveys. No observations of Humboldt martens have been documented on PALCO, so they are presumed to be very rare, or potentially absent in the plan area. There are approximately 59.680 acres of late seral and old growth habitat in the Plan Area which could be potentially

suitable for this mustelid.

c) Activities with Potential for Impacts

Covered activities with the potential to impact Humboldt martens are associated with timber management. Modification of mature forest to younger seral types could cause temporary reduction of habitat suitable for this species. The removal of all snags, downed logs, or large wildlife trees from otherwise suitable habitat as a result of timber harvest could be detrimental to this species.

d) Mitigation Measures

Mitigation for this species includes the Headwaters Reserve, MMCAs, maintenance of habitat diversity including late seral, and retention and recruitment of snags and other large wildlife trees. Because of the uncertainty over the existence of this species in the plan area, mitigation will concentrate on maintaining habitat refugia and elements, so that habitat will exist should the species recover. It is highly likely that the MMCAs and the aquatics conservation strategy, in combination with spotted owl conservation measures and maintenance of habitat diversity will produce a mosaic of potentially suitable habitat, connected by habitat corridors, similar to that recommended for federal lands (Ruggiero et al. 1994).

e) Potential Impacts of the Incidental Taking

The plan area is a relatively small portion of the overall distribution of martens. However, it is a relatively significant portion of what is thought to be the distribution of *M. a. humboldtensis.* Projections for the occurrence and distribution of late seral habitat throughout the plan period, in combination with the strategy to retain and recruit habitat elements such as snags and large wildlife trees, indicates that adequate suitable habitat will be present on the Plan Area landscape.

f) Monitoring/Adaptive Management

Compliance monitoring for this species will be accomplished through inventory of forest seral types, snags and downed logs, and riparian buffers. Effectiveness of the mitigation will be monitored through the habitat element retention and recruitment strategy. Data gathered on the habitat elements of this species will be reported in five year intervals.

3. *Martes pennanti pacifica,* Pacific fisher

a) Natural History

The Pacific fisher is listed as a California species of special concern. In California, the Pacific fisher ranges from the Oregon border south to Sonoma County on the coast, to Lake County in the coast range, and south to Kern County in the Sierra Nevada. In northern California they range east to Lassen County (Williams 1986). Specific habitat for Pacific fishers has been described as dense forested stands comprised primarily of large diameter conifer trees which provide suitable winter cover, or simply as mature forests (Thomasma et al. 1991, Mullis 1985). Riparian areas are mentioned as important Pacific fisher habitat, especially for travel and escape (Buck 1982, Mullis 1985). Although generally associated with dense mature forests, they are often found in second growth forests, and sometimes in forest openings (Williams 1986). Recent studies in California, including on managed timberlands, have indicated that a large majority of resting and denning sites occur in CWHR 40 stands (Zielinski 1995, Self and Kerns 1993). A recent study conducted in habitats similar to those found in the Plan Area area found that fishers were detected

significantly more often at higher elevations, in Douglas-fir dominated stands with greater amounts of hardwoods (Klug 1997). Klug (1997) found no relationship to stand age or old growth habitats. On the Six Rivers National Forest, Zielinski (1995) found natal dens in live trees 41" and 54"d.b.h., maternal dens in live trees 21" and 39"d.b.h.; snags 29" and 47"d.b.h.; and a downed log 39" diameter. In Idaho Jones (1994) found that 92% of rest sites were in mature or old growth forests. It may be that optimal habitat for fishers may include a mixture of forest types and ages (Jones 1991, 1994). In a notice of petition finding for the proposed listing of the fisher under the federal Endangered Species Act, the U.S. Fish and Wildlife Service (1991) concluded that insufficient information existed in the literature to draw reliable conclusions regarding the habitat preferences of Pacific fishers. The Service was again petitioned in 1994, but this petition was also denied (Biodiversity Legal Foundation 1994). Although somewhat of an omnivore, fisher range may be linked to the range of western grey squirrels (Sciurus *griseus).*

b) Baseline Condition

The pacific fisher may be expanding its range within the redwood region due to protection from trapping, and also the range expansion into this region of the porcupine, a key prey species (Yocom 1971, Yocom and McCollum 1973, and Gould 1987). As with the marten, Pacific fisher are a species predicted to occur in late successional habitat by the CWHR model, likely because of their apparent need for large trees or snags with cavities and other structure in dense stands (Zeiner et al. 199Oc). Beyer and Golightly (1996) suggested that a geographic pattern of fisher may exist in the redwood zone, with detection ratios declining in the southern portion of their study, which includes thePlan Area. Fisher were detected by sooted track plate surveys conducted on PALCO lands in the Humboldt and Yager WAAs (Kerns 1988, Chinnici, pers. obs.), but were not detected in further track plate surveys in 1994 (Beyer and Golightly 1996). Fisher were detected via Trailmaster camera sets as part of the multi-species work, and was considered to be a mid and late seral/old growth associate. PALCO observations are from the Yager WAA and Humboldt WAA. There have been four Pacific fisher detections resulting from approximately 2,000 camera nights in 1995 and 1996. Surveys recently completed in 1997 and 1998 had similar results. There are approximately 59,680 acres of late seral and old growth habitat in the Plan Area which could be potentially suitable for this mustelid.

c) Activities with Potential for Impacts

Timber management activities which fragment stands, decrease canopy closure, or remove large snags and downed logs are covered activities possibly detrimental to fishers by reducing habitat suitability or increasing competition from other species. Conversion of hardwood stands to homogeneous stands of Douglas-fir may be detrimental (Klug 1997).

d) Mitigation Measures

Mitigations for this species include the Headwaters Reserve and MMCAs, maintenance of habitat diversity including late seral, and retention and recruitment of snags, large wildlife trees, and downed logs. Projections for redwood and Douglas-fir 4D, 5M, 5D, and 6 CWHR stands indicate that these types will be well represented throughout the plan period (Volume III, Part C). The aquatics conservation strategy and snag retention and recruitment strategy include standards for retention of large trees suitable for resting and denning sites. As mentioned above in the Humboldt marten discussion, the combination of conservation strategies presented in the plan is highly likely to result in a strategy for the Pacific fisher such as recommended for federal lands. Monitoring of the habitat elements of this species will also occur through the snag and large woody debris recruitment program.

e) Potential Impacts of the Incidental Taking

The plan area is a relatively small portion of the overall distribution of this species. Projections for the occurrence and distribution of mid to late seral habitat throughout the plan period, in combination with the strategy to retain and recruit habitat elements such as snags and large wildlife trees, indicates that adequate suitable habitat will be present.

f) Monitoring/Adaptive Management

Compliance monitoring for this species will be accomplished through inventory of forest seral types, snags and downed logs, and riparian buffers. Effectiveness of the mitigation will be monitored through the habitat element retention and recruitment strategy. Data gathered on the habitat elements of this species will be reported in five year intervals.

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